

FOREST SERVICE HANDBOOK  
MISSOULA, MONTANA  
OGDEN, UTAH

FSH 2509.22 - SOIL AND WATER CONSERVATION PRACTICES HANDBOOK

Region 4 Amendment No. 1

Effective May 1988

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Digest:

Establishes a new handbook to develop site specific soil and water conservation practices for use on National Forest system lands in R-1 and R-4 to comply with direction in the Clean Water Act.

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01 - AUTHORITY. The Clean Water Act of 1972 (Public Law 92-500), as amended in 1977 (Public Law 95-217) and 1987 (Public Law 100-4), was intended by Congress to provide a means to protect and improve the quality of the water resources and maintain their beneficial uses. The clean Water Act (Sections 208 and 319) recognized the need for control strategies for nonpoint source pollution. To provide environmental protection and improvement emphasis for water and soil resources and water-related beneficial uses, the National Nonpoint Source Policy (December 12, 1984), the Forest Service Nonpoint Quality Strategy (January 29, 1985), and the USDA Nonpoint Source Water conservation practices were recognized as the primary control mechanisms for nonpoint sources of pollution on National Forest System lands. This perspective is supported by the Environmental Protection Agency (EPA) in their guidance, "Nonpoint Source Controls and Water Quality Standards" (August 19, 1987).

Federal agency compliance with water pollution control mandates is addressed through Section 313 of the Clean Water Act and in Executive Order 12580 of January 23, 1987. Agency compliance is to be consistent with requirements that apply to "any nongovernmental entity" or private person. Compliance is to be in line with "all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution". To comply with State Water Quality Standards, the Forest Service is required to apply water quality practices in State Forest Practices Regulations, where applicable, reasonable land, soil, and water conservation practices, or specialized best management practices. All these types of practices are designed with consideration of geology, land type, soil type, erosion hazard, climate, cumulative effects, and other factors in order to fully protect and maintain soil, water, and water-related beneficial uses, and to prevent or reduce nonpoint source pollution.

02 - OBJECTIVE. The objective of this handbook is to present a process to develop site specific conservation practices for use on national Forest System lands to minimize effects of management activities on soil and water resources, and to protect water-related beneficial uses. It describes the application, monitoring, evaluation, and adjustment of these conservation practices. This handbook is also to provide examples of soil and water conservation practices which have been tested and have provided protection in specific situations, and that can be utilized or adapted in developing in developing site specific conservation practices. Additionally, this handbook is a supplemental document to all Forest Plans.

03 - POLICY. The Forest Service must be responsive to the environmental intent and directives provided in the Clean Water Act, as amended, State water quality goals and standards, and other environmental legislation. As part of its land stewardship policy, the Forest Service's management actions must be carried out in a manner which protects the soil and water resources. The Forest Service will continue to coordinate all management actions affecting water quality and beneficial uses with State water quality agencies and will provide leadership in nonpoint source pollution control for Forest Management.

In accordance with the Multiple Use-Sustained Yield Act and other legislation (RPA, NFMA, and so forth), National Forest System lands are to be managed for multiple uses, Maintenance of

soil and water resources and protection of water-related beneficial uses are among those multiple uses. Use of soil and water conservation practices are a means to ensure protection of those resources and uses, while achieving other resource objectives. Application of soil and water conservation practices translates, in essence, to good land stewardship.

Pursuant to Section 208 of the Clean Water Act, all agencies which are responsible for carrying out any portion of a State Water Quality management Plan to minimize nonpoint source pollution must be designated as a Water Quality management Agency. The Forest Service has been recognized as the Designated Water Quality Management Agency for National Forest System lands in the Northern and Intermountain Regions. This handbook has been prepared to provide the Forest Service with a means to meet requirements for obtaining and maintain this designation.

#### 04 - RESPONSIBILITY.

1. Regional Forester. The Regional Forester shall:
  - a. Provide program guidance in soil and water conservation practices.
  - b. Provide soil and water conservation practices training and materials.
  - c. Coordinate with appropriate State and other Federal agencies involved in water quality regulations, management of water-related beneficial uses, watershed management, and best management practices.
  - d. Monitor and evaluate on a regional basis the implementation and effectiveness of soil and water conservation practices.
  - e. Notify the State of the result of monitoring and evaluation.
2. Forest Supervisor. The Forest Supervisor shall:
  - a. Train appropriate Forest personnel in development and use of soil and water conservation practices.
  - b. Coordinate with appropriate State and other Federal agencies involved in water quality regulation, management of water-related beneficial uses, watershed management, and best management practices.
  - c. Develop and improve soil and water conservation practices with respect to changing technologies and Forest Service direction.
  - d. Notify the Regional Forester of any development or improvement of soil and water conservation practices.
  - e. Monitor the implementation and effectiveness of site specific, soil and water conservation practices and suggest any necessary adjustments.
3. District Ranger. The District Ranger shall:
  - a. Develop and implement site specific, soil and water conservation practices.

- b. Develop and implement site specific, soil and water conservation practices on all resource management project.
- c. Monitor the implementation and effectiveness of site specific, soil and water conservation practices and provide any necessary adjustments.

## 05 - DEFINITIONS.

### 1. List of Abbreviations.

APD	-	Application for Permit to Drill
BLM	-	Bureau of Land Management
BMP	-	Best Management Practices
COR	-	Contracting Officer's Representative
CFR	-	Code of Federal Regulations
EA(R)	-	Environmental Assessment (Report)
EO	-	Executive Order
EPA	-	Environmental Protection Agency
EIS	-	Environmental Impact Statement
FAR	-	Federal Acquisition Regulations
FERC	-	Federal Energy Regulatory Commission
FS	-	Forest Service
FSH	-	Forest Service Handbook
FSM	-	Forest Service Manual
ID	-	Interdisciplinary
MOU	-	Memorandum of Understanding
NEPA	-	National Environmental Policy Act
NFMA	-	National Forest Management Act and/or Regulations
ORV	-	Off Road Vehicle
R-1	-	Region 1 (Northern Region) of the USDA Forest Service
R-4	-	Region 4 (Intermountain Region) of the USDA Forest Service
RPA	-	Resource Planning Act
SA	-	Sale Administrator
SCS	-	Soil conservation Service
STORET	-	A storage and retrieval computer system for water quality data administered by the Environmental Protection Agency
SPCC	-	Spill Prevention Control and Counter Measure
SWCP	-	Soil and Water Conservation Practice
TSA	-	Timber Sale Administrator

### 2. Glossary of Terms.

Area Transportation Plan. A plan that identifies the transportation facilities needed to manage the lands and resources for a given area.

Baseline Data. Data representative of a particular base period or concurrent control sample. Normally representative of the undisturbed, undeveloped state.

Beneficial Use. Actual or potential use that may be made of the waters of the state, including but not necessarily limited to domestic, municipal, agricultural, and industrial supply;

power generation; recreation; esthetic enjoyment; navigation; preservation and enhancement of fish, wildlife and other aquatic resources.

Best Management Practice (BMP). A practice or combination of practices, that is determined by a State (or designated area-wide planning agency) after problem assessment, examination of alternative practices, and appropriate public participation to be the most effective, practical (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals (40 CFR 130.2(q)).

Best Management practices as defined by State regulation or agreement between the State and Forest Service include the following by state:

In Idaho:

- Idaho Forest Practices Rules and Regulations.
- Rules and Regulations and Minimum Standards for Stream Channel Alterations.
- Idaho Best Management Practices for Road Activities Handbook, Parts I and II.

In Montana:

- Best Management Practices for the Flathead River from the Flathead Drainage 208 Project, Appendix A (Only applicable to the Flathead National Forest).
- Best Management Practices (BMP's) for Forestry in Montana.

In Nevada:

- Handbook of Best Management Practices (Nondesignated Area, Water Quality Management Plan).

In Utah:

- Best Management Practices for Nonpoint Source Pollution Reduction in Waters of Summit, Wasatch, and Utah Counties.
- Best Management Practices for Nonpoint Source Water Pollution Control in Utah.
- Salt Lake County Water Quality and Pollution Control: Erosion-Sediment Control Handbook.
- Land Use vs. Water Quality - Wasatch Streams.

Carrying Capacity. (Recreation): the amount of recreation use an area can sustain without deterioration of site quality; (Wildlife): the maximum number of animals an area can support during a given period of the year; (Range): the maximum stocking rate possible without damaging the vegetation or related resources. Carrying capacity may vary from year to year on the same area due to fluctuating forage production.

Contract Provisions. Controls, constraints, and/or general direction included in Contracts offered by the Forest Service.

Cross Drain/Ditch. A man-made ditch or channel constructed to intercept surface water runoff and divert it before the runoff concentrates to erosive volumes and velocities.

Crowning. Forming a convex road surface which allows runoff to drain from the running surface to both sides of the road prism.

Cumulative Effect. The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency or person undertakes such other action (40 CFR 1508.7).

Degraded Watershed. A basin which has suffered environmental damage, resulting in accelerated soil or vegetative loss or chemical contamination to the quantifiable detriment of other resources.

Designated Streams. A stream or portion of a stream identified as warranting special consideration in management decisions and project activities. See also Stream or Stream course.

Floodplain. The lowland and relatively flat areas adjoining inland waters that are covered by its waters during flooding.

Hazardous Substances. Materials which by their nature are toxic or dangerous to handle or dispose of, such as radioactive materials, petroleum products, pesticides, chemicals, and biological wastes.

In-Service. Pertains to activities, actions, or personnel within the USDA Forest Service.

Interdisciplinary Team. A group of individuals from various disciplines or with different skills appropriate to resolve the issues or problems identified. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the identified issue or problem. The members of the team proceed to solution with frequent interaction, so that each discipline may provide insights to any stage of the problem and disciplines may combine to provide new solutions.

Line Officer. Management personnel within the Forest Service Organization consisting of: Secretary of Agriculture, Chief of Forest Service, Regional Foresters, Forest Supervisors, and District Rangers, Refers to the line of authority and responsibility.

Log Landing. An area where logs are skidded or yarded prior to loading and transportation to a mill.

Mitigate. To offset or lessen real or potential impacts or effects through the application of additional controls or actions. Counter measures are employed to reduce or eliminate undesirable or unwanted results.

NEPA Process. All measures necessary for compliance with the requirements of section 2 and Title I of the National Environmental Protection Act (NEPA).

Nonpoint Source Pollution. Diffuse sources of water pollution that originate from many indefinable sources and normally include agricultural and urban runoff, runoff from construction activities, and so forth. In practical terms, nonpoint sources do not discharge at a specific, single location (such as a single pipe). Nonpoint source pollutants are generally carried over or through the soil and ground cover via stormflow processes. Unlike point sources of pollution (such as industrial and municipal effluent discharge pipes), nonpoint sources are diffuse and can come from any land area. The following silvicultural activities are considered to be nonpoint sources of pollution: nursery operations, site preparation, reforestation and subsequent cultural treatment,

thinning, prescribed burning, pest and fire control, harvest operations, surface drainage, and road construction and maintenance from which there is natural runoff (40 CFR 122.27).

Normal Operating Season. A portion of a year when normal timber harvesting operations are expected to take place uninterrupted by adverse weather conditions.

Outsloping. Shaping a road to cause drainage to flow toward the outside shoulder (generally the fill slope), as opposed to insloping which encourages drainage to flow to the inside shoulder (generally the cut slope). Emphasis is on avoiding concentrated water flow.

Permittee. Individual or entity that has received a grazing or Special Use Permit from the Forest Service.

Pesticide. A general term applied to a variety of chemical materials including insecticides, herbicides, fungicides, and rodenticides.

Point Source. Originating from a discrete identifiable source or conveyance. Silvicultural point sources of pollution include the following: rock crushing, gravel washing, and log sorting and storage facilities where water is applied intentionally to the logs (40 CFR 122.27).

Purchaser. The entity which is awarded a USDA Forest Service contract after bidding, usually with competition. As used in timber, the entity which has purchased timber as identified in a timber sale contract.

Reclamation. Restabilization of land denuded by land management activities.

Reforestation. The replacement of vegetative cover which has been harvested or lost due to natural occurrences. Accomplished either through planting of nursery stock or seeding, or through natural processes.

Revegetation. The replacement of vegetative cover which has been harvested or lost due to natural occurrences. Accomplished either through planting of nursery stock or seeding, or through natural processes.

Riparian Areas. Geographically delineable areas with distinctive resource values and characteristics that are comprised of the aquatic and riparian ecosystems.

Riparian Ecosystems. A transition between the aquatic ecosystem and the adjacent terrestrial ecosystem; identified by soil characteristics or distinctive vegetation communities that require free or unbound water.

Rip Rapping. The use of large rock, boulders, concrete chunks, or similar non-erosive, heavy objects as an armoring device.

Road Maintenance Plan. A documented schedule and program for upkeep of roads to provide a level of service for the user and protection of resources. There are five levels of maintenance: Level I is the least intense and Level V the most intensive.

Rocking. The application of aggregate to a roadbed to provide strength and a more stable erosion resistant surface.



Sale Area Map. A map of suitable scale and detail to be legible which is part of a timber sale contract. The map identifies sale area boundaries and contract requirements specific to the sale.

Significant Disturbance. Disturbance of surface resources, including soil, water and vegetation, which has the potential to degrade water quality to a level requiring corrective action.

Site Preparation. A general term for removing unwanted vegetation, slash, and even roots and stones from a site before reforestation. It is generally accomplished by either mechanical, chemical, or biological means, or controlled fire.

Site Specific. Pertains to a discernible, definable area or point on the ground where a project or activity will (or is proposed) to occur.

Soil and Water Conservation Practices (SWCP). The set of practices which, when applied during implementation of a project, ensures that soil productivity is maintained, soil loss and water quality impacts are minimized, and water-related beneficial uses are protected. These practices can take several forms. Some are defined by State regulation or memoranda of understanding between the Forest Service and the States and thus are recognized as Best Management Practices (BMP's). Others are defined by the Forest interdisciplinary teams or described in Forest Service manuals and Handbooks. Both kinds of SWCPs are included in the Forest Plans as Forest-wide standards or are referenced in the plans. A third kind of SWCP is identified by the interdisciplinary team for application to specific management areas. These are included as management Area Standards in the appropriate management areas in the Forest Plan. A fourth kind, site specific SWCPs, are based on project level evaluation and represent most effective and practical means of accomplishing the soil and water resource goals and protecting the beneficial uses of a specific area. These site specific conservation practices supplement the Forest Plan for specific projects. In Idaho, these site specific SWCPs are recognized as specialized Best management practices in the State's Water Quality Regulations. This handbook will aid in the development of the fourth kind of SWCP.

Soil Productivity. The capacity of a soil to produce a specific crop such as fiber and forage, under defined levels of management. It is generally dependent on available soil moisture, nutrients, texture, structure, organic matter, and length of growing season.

Special Use Permit. A permit issued under established laws and regulations to an individual, organization, or company for occupancy or use of national Forest system lands for some special purpose.

Specified Road. A forest development transportation system road that is identified in and to be constructed or reconstructed under a Forest Service timber sale contract.

Stream or Streamcourse. A natural channel with defined bed and banks. It may be perennial, intermittent, or ephemeral.

Streamside Management Zone (SMZ). A designated zone that consists of the stream and an adjacent area of varying width where management practices that might affect water quality, fish, or other aquatic resources are modified. The SMZ is not a zone of exclusion, but a zone of closely managed activity. It is a zone which acts as an effective filter and absorptive one for sediment; maintains shade; protects aquatic and terrestrial riparian habitats; protects channel and streambanks; and promotes floodplain stability. The SMZ may be wider than the riparian area.

Wetlands. Those area that are inundated by surface or groundwater with a frequency sufficient to support, and under normal circumstances do or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

Windrowing. To pile slash or debris in a row along the contour of the slope.

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

R-1  
Missoula, Montana

R-4  
Ogden, Utah

Forest Service Handbook 2509.22

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10.10 - Introduction. Soil and water resources and water-related beneficial uses are best protected during land disturbing activities from nonpoint source pollution by use of site specific, soil and water conservation practices. These are developed in an interdisciplinary process. This process places emphasis for maintenance and protection of these resources and uses on the application of the site specific practices, monitoring successes and failures, and adjusting the practices and/or evaluation criteria until the resources are protected. This handbook describes this process and provides some examples of proven soil and water site specific practices, design standards and risks, environmental effects, practicality, and institutional, political, social, economic, and technical feasibility must be considered. The subsequent discussion the process in 10.1-10.4 is supported and additional described by W. C. Haper in "A Resource Agency's perspective on Nonpoint Source management" (Symposium on Monitoring, Modeling, and Mediating Water Quality, American Water Resources Association, May 1987, pages 641-652).

The soil and water conservation practices that are presented in this handbook are generally the initial development stage for site specific practices. They were compiled from Forest Service manuals, handbooks, contract and permit provisions, and policy statements. Their use or modification as more site specific conservation practices will directly or indirectly improve water quality, protect beneficial uses, reduce losses in soil erosion and productivity, and abate or mitigate management effects, while meeting other resource goals and objectives.

These soil and water conservation practices in this handbook are of three basic forms: administrative, preventive, and corrective. They are not detailed solutions for specific problems. However, in some instances, specific examples and practices are provided. For the most part, they are purposely broad to ensure site specific adaptation prior to their use. In additions, they identify management requirements and considerations to be addressed prior to and during the formulation of alternatives and the project implementation of land management activities.

10.20 - Development Considerations. The effects of land management activities on soil and water resources and water-related beneficial uses vary considerably. The extent of these management effects on these resources and uses is a function of:

- a. The physical, meteorologic, hydrologic, and biologic environment where the activity takes place (topography, physiography, precipitation, channel density, geology, soil type, vegetative cover, and so forth).
- b. The specific water-related beneficial use(s), the importance to various publics, and the sensitivity to management influences.
- c. The type of activity imposed on a given environment (recreation, mineral exploration, timber management, and so forth) and it's real extent and magnitude.
- d. The method of application and the duration of the activity (grazing system used, types of silvicultural practice used, constant v. seasonal use, recurrent application or one-time application, and so forth).



- e. The season of the year that the activity occurs or is applied.

These factors vary within the National Forest System lands in the Northern and Intermountain Regions and from site to site. It follows then that the extent and kind of impacts are variable, as are the abatement and mitigation measures. No specific practice method, or technique is best for all circumstances. Thus, the soil and water conservation practices presented in this handbook include such phrases as "according to design", "as prescribed", "suitable for", "within acceptable limits", and similar qualifiers. The actual specifications, designs, and site specific conservation practices must be the result of evaluation and development by professional personnel through interdisciplinary involvement in the NEPA process. This results in conservation practices that are tailored to meet local resource requirements and needs for site specific conditions.

Area universities and Research have generated much information that can be utilized for development of appropriate conservation practices. However, this information tends to be developed for a specific site. While such information is valuable, it should be used with caution when developing conservation practices. This information may not adequately reflect site specific conditions associated with other projects or locations, or consider spatial and temporal distribution of other land management activities.

Additionally, it is important to establish an acceptable level of risk associated with failure in developing site specific conservation practices. Since land managers must work with the natural environment, all its complexities, and therefore uncertainty, it is necessary to accept some level of risk with any design. An important but difficult task is to agree on an acceptable level of risk for given projects based on possible impacts on other resources, and the need to conduct the management of risk dictates that there will be some projects which will fail to meet an absolute standard. Through the process of monitoring, evaluation, and adjustment of SWCP's, soil and water resources and water-related beneficial uses can be maintained and protected.

NEPA and Interdisciplinary Involvement. The NEPA process and interdisciplinary involvement is critical for the development of site specific conservation practices. Direction for the NEPA process (environmental analysis and documentation) is contained in Forest Service Policy and Procedures that are found in FSM 1950 and FSH 1909.15. They also provide direction to incorporate the interdisciplinary process in planning and decision-making.

The soil and water conservation practices detailed in this handbook were utilized in Forest Planning in the Northern and Intermountain Regions and now supplement all Forest Plans. The interrelationships between Forest Planning and Forest Plan Implementation (project identification/administration) are described in FSM 1922.5 and FSH 1909.12, and being further refined by informational and awareness efforts in both Regions. During Forest Plan Implementation, the Soil and Water Conservation practices Handbook together with the Forest Plan are used by the interdisciplinary team to develop site specific conservation practices.

In NEPA, interdisciplinary involvement is essential to the success of the process. Interdisciplinary involvement is the use of a team of individuals who represent two or more areas of professional knowledge, learning, and/or skill. They concentrate on the same subject, such as development of conservation practices, to derive a common resolution or product. The team is not necessarily a fixed assortment of professionals. Team members represent the skills necessary to provide input for alternative formulation, evaluation, and conservation practice development. They are identified by either a core team or technical staffs, the Staff Officer, the Line Officer or a combination of all three. The final team composition is approved by the Line officer with project approval authority.

The Forest Service utilizes interdisciplinary involvement to investigate problems, evaluate alternatives, analyze environmental considerations, develop site specific practices, and aid decision-making. The responsibility for making the decision lies with the Line Officers (that is, District Rangers, Forest Supervisors, and so forth), not the team. The team's responsibility is to provide the responsible official with alternatives and evaluations needed to make a reasonable decision.

10.30 - Application. After development of site specific conservation practices, they are implemented on the ground along with other specific requirements, controls, and considerations that were built into a project activity.

A training and information program for personnel that are involved in application of conservation practices is critical to ensure maximum effectiveness of the practice in maintenance and protection of soil and water resources and water-related beneficial uses. This training and information program should involve Forest Service resource staff, Line Officers, and State Water Quality personnel. It should cover resource protection, water quality and beneficial use management opportunities, cause and effect relationships, and the relevance of conservation practices, their legal aspects, and their application. In addition to Contracting Officers, Engineering Representatives, and certified Sale Administrators, disciplines involved in activities which have the potential to affect water quality, beneficial uses, and soil resources should be offered more intensive training.

10.40 - Feedback Mechanism. Following application of site specific conservation practices, they are monitored and evaluated. Subsequent adjustments and modifications are made to the conservation practices and/or water evaluation criteria until the soil and water resources and water-related beneficial uses are protected. This feedback mechanism is absolutely necessary to ensure sound land stewardship by the Forest Service.

### Monitoring

Monitoring is the first step of the feedback mechanism. It is designed to answer questions about site specific conservation practice development, application, and effectiveness. Specific questions may be:

Were the appropriate conservation practices included in the project?

Did the project follow the plan?

Are the conservation practices technically sound and appropriate for the specific site conditions?

Is there a better conservation practice to apply which is technically sound, economically feasible, within institutional authority, and protects the resources?

Were the conservation practices applied in total concept or only partially employed?

Were personnel, equipment, funds, or training lacking which resulted in incomplete or inadequate application?

How effective were the site specific conservation practices in meeting the evaluation criteria?

Monitoring also is designed to seed answers about the appropriateness of practices in maintaining or protecting soil and water resources and water-related beneficial uses. Some questions may be:

Are the practices protecting the soil and water resources and beneficial uses?

Do the parameters that are monitored establish the right indices to indicate protection of resources or uses?

Is there a cause and effect relationship between the conservation practices and soil and water resources and beneficial uses?

Was the hydrologic risk that was built into the practice exceeded?

To monitor all aspects of site specific conservation practices, an appropriate mix of both extensive and intensive monitoring is needed and performed at established intervals. Extensive monitoring is the primary means that the Forest Service will use to evaluate the development, application, and effectiveness of conservation practices. It can be characterized by use of project reviews and collection of both quantitative and qualitative information on nearly all project activities. Intensive monitoring tends to be more costly than extensive monitoring, and will be restricted to the determination of cause /effect relationships and specific conservation practice effectiveness both on a representative sample basis. This type of monitoring obtains mostly quantitative information. Both extensive and intensive levels of monitoring are described and further discussed in Forest Service manuals and handbooks.

### Evaluation

Evaluation is the second step in the feedback mechanism. To evaluate monitoring information and judge the effectiveness of site specific conservation practices, evaluation criteria must be defined. The Forest Plan standards and State Water Quality Standard Criteria have been developed to serve as the evaluation criteria. These criteria should be defined in quantitative terms, whenever possible. However, they should avoid instantaneous measurements given the dynamic nature of nonpoint source conditions. These criteria should recognize and consider the attributes and characteristics of the particular resource or use, natural variability and background, limits of acceptable change in magnitude and duration, transport mechanisms and pathways, time delayed effects, and risk.

In design of monitoring and during evaluation, certain elements in the application of soil and water conservation practices must be recognized and acknowledged. The first of these is that a certain risk of failure is inherent in each site specific conservation practice utilized. This risk is a balance between the value of the resource(s) to be protected and the cost of additional units of protection. Monitoring and evaluation must not only measure effects but must determine when a design failure point has been exceeded. This has been discussed earlier in this chapter (Development Considerations).

Another consideration is recognition that the link between land management activities and the resulting impacts on soil and water resources and water-related beneficial uses is not always well understood. Monitoring and evaluation must be designed to improve our knowledge of this link and to provide an early warning system where little research information exists for guidance. Where adequate research information exists for similar conditions, the use of site specific conservation practices that are designed and based on this information can be reasonably

expected to protect the soil and water resources and beneficial uses. In this case, monitoring and evaluation need not be so intensive.

The use of sometimes inappropriate, State Water Quality Standard Criteria in evaluation is another element to recognize. With existing technology, it is extremely difficult to determine the background levels and variability to a level of precision and accuracy necessary for direct control by numeric, State Water Quality Standards. This difficulty is particularly evident when considering the tremendous temporal and spatial variability of soil and water resources and water-related beneficial uses. Because many existing water quality standards do not recognize this variability, they may be of limited value as an evaluation criteria for nonpoint source activities. For this very reason, State Water Quality Standards for nonpoint sources in conjunction with conservation practices are also monitored, evaluated, and adjusted, if necessary. Without any adjustment, there is a danger that site specific conservation practices will be required that are technically sound and feasible but are of little or no value in protecting soil and water resources and beneficial uses.

### Adjustment

The last step of the feedback mechanism is adjustment. If monitoring and evaluation indicates evaluation criteria not being met, an adjustment of the site specific conservation practices are needed. This adjustment will vary dependent upon the type and severity of the impact to the soil and water resource or beneficial use. For minor or moderate impacts, the conservation practice will be redesigned or upgraded to assure the criteria are not exceeded. When the impact is major, the project activity will be reevaluated, redesigned, or dropped, or the application process for practices and other project requirements revised. Corrective actions to prevent or minimize the impact will be initiated immediately. Additionally, the appropriate evaluation criteria are reviewed for adjustment.

This feedback mechanism is an iterative type process. Through the continuous cycle of monitoring, evaluation, and adjustment of conservation practices and/or evaluation criteria, the site specific conservation practices will lead to achievement of evaluation criteria (that is, State Water Quality Standards and Forest Plan standards) and protection of soil and water resources and beneficial uses.

10.50 - Format. The general format used to present each of the conservation practices in this handbook is as follows:

<u>Heading</u>	<u>Context</u>
PRACTICE	Includes the sequential number of the practice and a brief title. The numbering of the activities does not have any intended significance.
OBJECTIVE	Describes the desired results or attainment of the practice as it relates to soil and water resource or beneficial use protection.
EXPLANATION	Further define the brief title and expresses how the practice is applied. Describes criteria or standards used when applicable.

IMPLEMENTATION

Describes where the practice is applied, who is responsible for application, direction and supervision, and when the practice is employed.

REFERENCES

Identifies the Forest Service Manual, Handbook, contract or permit provision, Code of Federal Regulation, policy statement and/or other references where the practice is further documented. The reference listings are not all inclusive.

Soil and water conservation practices are grouped by; management activity for ease of presentation and understanding. The activities are: (11) Watershed Management, (12) Recreation, (13) Vegetation Manipulation, (14) Timber, (15) Roads and Trails, (16) Minerals, (17) Range, and (18) Fire Suppression and Fuels Management. Although a practice might be shown under only one activity designation, it may apply to another activity. A number of the practices are referenced to more than one activity, and some apply to all activities.

11 - WATERSHED MANAGEMENT. Watershed management is the practice of protecting and maintaining soil and water resources and water-related beneficial uses. Management is oriented toward maintaining or enhancing watershed conditions favorable for optimum water yield and timing, water quality, and soil productivity. Watershed management includes the improvement of soil and water resources on National Forest lands damaged by catastrophic events or degraded by past use.

PRACTICE: 11.01 - Determination of Cumulative Watershed Effects.

OBJECTIVE: To determine the cumulative effects or impacts on beneficial water uses by multiple land management activities. Past, present, or reasonably foreseeable future actions in a watershed are evaluated relative to natural or undisturbed conditions. Cumulative impacts are a change in beneficial water uses caused by the accumulation of individual impacts over time and space. Recovery does not occur before the next individual practice has begun.

EXPLANATION: The Northern and Intermountain Regions will manage watersheds to avoid irreversible effects on the soil resource and to produce water of quality and quantity sufficient to maintain beneficial uses in compliance with State Water Quality Standards. Examples of potential cumulative effects are: 1) reduced natural woody debris input to stream channels that may cause reductions in fish habitat; 2) excess sediment production that may reduce fish habitat and other beneficial uses; 3) water temperature and nutrient increases that may affect beneficial uses; 4) compacted or disturbed soils that may cause site productivity loss and increased soil erosion; and 5) increased water yields and peak flows that may destabilize stream channel equilibrium.

IMPLEMENTATION: As part of the NEPA process, the Forest Service will consider the potential cumulative effects of multiple land management activities in a watershed which may force the soil resource's capacity or the stream's physical or biological system beyond the ability to recover to near-natural conditions. A watershed cumulative effects feasibility analysis will be required of projects involving significant vegetation removal, prior to including them on implementation schedules, to ensure that the project, considered with other activities, will not increase sediment or water yields beyond or fishery habitat below acceptable limits. The Forest

Plan will define these acceptable limits. The Forest Service will also coordinate and cooperate with States and private landowners in assessing cumulative effects in multiple ownership watersheds.

REFERENCES: 40 CFR 1508.7; for portions of Montana, Montana Department of State Lands Cumulative Watershed Effects Cooperative; for Idaho Forests, Idaho Forest Practices Water Quality Management Plan, 1987; R. N. Coats and T. O. Miller. 1981. Cumulative Silvicultural Impacts on Watersheds: A Hydrologic and Regulatory Dilemma. *Envir. Mgt.* 5(2):147-160.

**PRACTICE 11.02 - Soil and Water Resource Monitoring and Evaluation**

**OBJECTIVE:** To determine effects of land management activities on soil productivity and beneficial water uses; to monitor baseline watershed conditions for comparison with State standards, Forest Plan standards, and estimation of long-term trends; to ensure the health and safety of water users; to evaluate SWCP's effectiveness; and to determine the adequacy of data, assumptions, and coefficients in the Forest Plans.

**EXPLANATION:** The Northern and Intermountain Regions will manage watersheds to avoid irreversible effects on the soil resource and to produce water of quality and quantity sufficient to maintain beneficial uses in compliance with State Water Quality Standards. Monitoring and evaluation are needed as feedback mechanisms to compare the results of management activities and SWCPs on soil and water resources with previous conditions, desired end-products, and State standards. To accomplish this, a comparison will be made, on a representative sample basis, of effects on soils and water over time. Previous monitoring and evaluating has included, for example:

- a. Bulk density, soil disturbance, and/or tree growth to evaluate soil productivity.
- b. Fecal coliform and pH to monitor swimming sites.
- c. Sediment, turbidity, and water temperature to evaluate domestic water supplies.
- d. Sediment, dissolved oxygen, water temperature, pH, cobble embeddedness, percent fines in substrate, and channel cross sections to monitor effects on fisheries.

**IMPLEMENTATION:** Forest Plans will provide watershed monitoring plans that are focused on beneficial water uses such as domestic supplies, recreation, and fisheries, and on soil loss and productivity. Regionally approved monitoring techniques will be used. Specific monitoring plans will be coordinated among adjacent National Forests and with State water quality agencies. Specific monitoring and evaluation plans will include such items as:

- a. Monitoring objectives.
- b. Review of existing data and information.
- c. Location of monitoring sites.
- d. Soil and water quality characteristics that are to be monitored and evaluated.
- e. Type(s) or technique(s) of monitoring.
- f. Intensity of monitoring (frequency and duration).

- g. Responsibilities and roles of monitoring personnel. Methodology for analysis and evaluation.
- i. Estimated cost.
- j. Report preparation.

When changes and effect from management activity are detected, the Forest Service will evaluate their significance and determine appropriate action. Where project level activities will not meet Forest Plan or State standards, they will be redesigned, rescheduled or dropped.

The EPA computerized STORET system is the accepted repository for water quality data collected to monitor and evaluate Forest programs and management activities. Water quality data will be placed in this computer system for storage, manipulation and review.

REFERENCES: FSM 1922, 2525, 2532, and 2554; SWCP Handbook 10.40 Feedback Mechanism; FSH 1909.12, Land and Resource Management Planning Handbook, chapter 6; 36 CFR 219; Solomon, R. A. and Avers, P. E., 1987. A Water Quality Monitoring Framework to Satisfy Legal Requirements. AWRA Symposium on Monitoring, Modeling, and Mediating Water Quality. pp. 231-242; FSH 2509.18, Soil Monitoring Handbook, State Water Quality Standards; for Idaho Forests, Idaho Forest Practices Water Quality Management Plan, 1987; SWCP 12.02, 12.03, and 13.09; S. L. Ponce. 1980. Water Quality Monitoring Programs. USDA, Forest Service, WSDG Tech. Paper - 00002. 66 pp.; for R-4, R-4 Technical Guide for Preparing Water Quality Monitoring Plans, USDA, Forest Service, 1981.

PRACTICE: 11.03 - Watershed Improvement Planning and Implementation

**OBJECTIVE:** To improve degraded watershed conditions, to minimize soil erosion, and to improve water availability or quality.

**EXPLANATION:** Watershed improvement is a corrective measure. Factors considered in the evaluation of soil and water resource problems and subsequent improvement are: predicted changes in water quality and its associated effects on beneficial uses, downstream values, on-site productivity, threat to life and property, direct and indirect economic returns, and social and scenic benefits. Examples of water she improvement measures are stream bank stabilization, debris removal, soil ripping, seeding , and fertilizing.

**IMPLEMENTATION:** This conservation practice is typically implemented through the development of a soil and water resource improvement inventory, the approval of cost effective plans, and the funding of the paln and subsequent improvement action. If a soil and water resource problem is observed and documented by Line Officers, an interdisciplinary team will assess each site, develop the necessary actions to correct the problem and integrate them into the Forest Planning process for funding and execution. The NEPA process will be followed in the planning and implementation of improvement measures. The actual implementation work may be done by Forest Service crews or contract. Effectiveness of improvement measures will be monitored and evaluated.

REFERENCES: FSM 2522; FSH 2509.15, Watershed Improvement Handbook; NFMA.

PRACTICE: 11.04 - Floodplain Analysis and Evaluation

**OBJECTIVE:** To protect floodplain values and avoid, where possible, the long and short-term adverse impacts to soil and water resources associated with the occupancy and modification of floodplains.

**EXPLANATION:** A flood hazard analysis and evaluation will be made prior to acquisition or exchange of land within floodplains. A floodplain analysis and evaluation will be made when sites within floodplains are being considered for structures, developments, or management activities. Environmental quality, ecological effects, and individual safety and health are considered. Flood frequencies, watershed conditions, climatic and environmental factors associated with past flood events, flood flow quantities and specific flood boundaries are all evaluated.

**IMPLEMENTATION:** The Regional Forester is responsible for ensuring consideration of floodplain hazards and values in all NEPA planning processes. The Forest Supervisor, through use of technical staffs, is responsible for:

- a. Determining if proposed facilities are within 100 and 500 year floodplain boundaries.
- b. Determining if data currently exist about floodplain boundaries.
- c. Documenting analysis of floodplain hazards and management options.
- d. Requiring flood hazard evaluations prior to issuance of special-use permits.
- e. Ensuring that floodplain hazards, management considerations, and appropriate restrictions are included in authorizing documents.
- f. Designing, constructing, or rehabilitating National Forest real property in accordance with criteria outlined in the National Flood Insurance Program.
- g. Providing for conspicuous marking of highest past and probable future flood heights, on permanent structures including those in developed recreation sites.

**REFERENCES:** EO 11988, Floodplain Management; FSM 2527; Maxwell, J. and LaFayette, R., 1986 Guidelines for Making Floodplain and Wetland Evaluations for Land Exchanges. USDA, Forest Service, Southwestern Region Hydrology Note No. 19a.

**PRACTICE:** 11.05 - Wetlands Analysis and Evaluation

**OBJECTIVE:** To maintain wetlands functions and avoid adverse soil and water resource impacts associated with the destruction or modification of wetlands.

**EXPLANATION:** The Forest Service does not permit the implementation of activities and new construction in wetlands whenever there is a practical alternative. Through the NEPA process, a wetland analysis and evaluation will be made prior to acquisition or exchange of wetlands. Evaluation of proposed actions in wetlands will consider factors relevant to the proposal's effect on the survival and quality of the wetlands. Factors to be considered include water supply, water quality, recharge areas, flood and storm hazards, flora and fauna species, soil types, habitat diversity and stability, and hydrologic utility.



**IMPLEMENTATION:** The Regional Forester is responsible for insuring wetland values are considered and documented as an integral part of all planning process. The Forest Supervisor, through use of technical staffs, will determine whether proposed actions should be located in wetlands and, if so, whether there is a practicable alternative. If there are no viable alternatives, the Forest Supervisor must insure that all mitigating measures are incorporated into the plans and designs and that the actions maintain the function of the wetlands. Identification and mapping of wetlands are part of the Forest Planning process.

**REFERENCES:** EO 11990, Protection of Wetlands; FSM 2527; Maxwell, J. and LaFayette, R., 1986. Guidelines for Making Floodplain and Wetland Evaluations for Land Exchanges. USDA, Forest Service, Southwestern Region Hydrology Note No. 19a.

**PRACTICE 11.06 - Public Supply Watershed Management**

**OBJECTIVE:** To manage community and noncommunity public supply watersheds to comply with State water quality standards.

**EXPLANATION:** The Northern and Intermountain Regions will manage public supply watersheds for multiple use with special emphasis on providing water suitable for human consumption within the realm of State Water Quality Standards, water supply regulations, and Forest Plan standards.

**IMPLEMENTATION:** Watersheds identified by the States as public supply watersheds will be recognized in Forest Plans. Forest Plans will include management goals and standards which will guide the management of the watershed and result in compliance with State Water Quality Standards. All project plans will be reviewed through the NEPA process which includes review by the appropriate State agency and by the water users and tiered to direction in the Forest Plans and EIS.

**REFERENCES:** FSM 2542; State Drinking Standards; State Public Water Supply Regulations; 36 CFR 251.

**PRACTICE 11.07 - Oil and Hazardous Substance Spill Contingency Planning**

**OBJECTIVE:** To minimize contamination of waters from accidental spills by prior planning and development of Spill Prevention Control and Countermeasure Plans.

**EXPLANATION:** A contingency plan is an immediate reporting and action plan that contains a predetermined organization to be implemented in the event of a hazardous substance spill. Factors considered for each spill are: the specific substance spilled, the quantity, its toxicity, proximity of spill to waters, and the hazard to life, property, and the environment.

The Spill Prevention Control & Countermeasure (SPCC) plan is a document which requires appropriate measures to prevent oil, petroleum products, or known hazardous materials that could be spilled from entering the navigable waters of the United States. An SPCC plan is needed if the total, above-ground storage of oil, petroleum products, or known hazardous materials exceeds the appropriate "reportable quantity" and if these facilities could reasonably be expected to discharge these hazardous substances into surface waters in the event of a spill.

**IMPLEMENTATION:** Each Forest is responsible for designating emergency spill coordinators and documenting names and telephone numbers of agencies to call regarding notification and clean-up of spills. Individual Forests may maintain an inventory of materials to use during the

clean-up of a spill. Disposal sites will be coordinated with EPA, State, and local officials responsible for safe disposal.

If a spill is from a Forest Service facility or operation, the Forest Service is the "person in charge" and is responsible for all reporting and immediate response actions, as appropriate. If the spill is from a third party operation, the Forest Service will only respond and report the spill if the third party fails to take appropriate action. The Forest Service will generally turn its incident command role over to authorized, Federal On-Scene Coordinators or other authorized, State or local authorities after their arriving at the spill site, and provide support services.

SPCC plans are required for Forest Service owned and special use permitted facilities, and include timber sale operators and other construction contracts. All SPCC plans must be reviewed and certified by a registered professional engineer.

REFERENCES: FSH 6740, 7442, 7443, and 7460; 40 CFR 112; FSH 6709.11, Health and Safety Code Handbook; FSH 6709.12, Safety and Health program Handbook; R-1 and R-4 Emergency and Disaster Plan; Oil and Hazardous Substances Pollution Contingency Plan for EPA Regions 8 and 10, 7/26/85; State Hazardous Waste management Plans; SWCP 11.11, 13.07, and 13.10.

**PRACTICE 11.08 - Control of Activities Under Special Use Permit**

**OBJECTIVE:** To protect surface and subsurface soil and water resources from physical, chemical, and biological pollutants resulting from activities that are under special use permit.

**EXPLANATION:** Many activities and uses take place on National Forest lands which are not directly related to Forest Service management activities. Some examples are: hydropower plants, water diversions and water transmission systems, electronic sites, highway and railroads rights-of-way, waste water treatment and disposal, solid waste disposal, and power transmission lines. There are other uses which are recognized Forest Service land management activities which are achieved through permits to a public or private agency, group, or individual. Examples of these types of uses are: organization camps, recreation residence tracts, and ski areas.

Management objectives and Forest Service authority may be limited on lands withdrawn under Federal Energy Regulatory Commission (FERC) authority. When the FERC license is renewed, the Forest Service makes a complete reevaluation of water quality and quantity needs, values, and effects, and updates the management controls within which the permittee must comply.

**IMPLEMENTATION:** The special use permit under which these agencies, groups, or individuals operate, details the conditions that they must meet to continue operating. The permittees are required to conform to all applicable State and local regulations governing water quality and sanitation. Failure on the part of the permittee to meet the conditions of the special use permit may result in the permit being revoked. Relevant SWCP's from this and other sections may be required: 11.01, 11.04, 11.05, 11.07, 11.10, 11.11, 12.04, 12.06, 12.07, 12.08, 13.04, 13.07-13.13, 14.12-14.14, 14.20, 15.01-15.18, 15.21.

REFERENCES: FSM 2700.

**PRACTICE: 11.09 - Management by Closure to Use**

**OBJECTIVE:** To exclude activities that could result in damages to facilities or degradation of soil and water resources.

**IMPLEMENTATION:** Closures (seasonal, temporary, or permanent) are made when the responsible Line Officer determines that a particular resource or facility needs protection from use. The decision to close an area is made after an evaluation of alternative methods of protection.

**REFERENCES:** EO 11644, use of Off-Road Vehicles on the Public Lands, and 11989, Off-Road Vehicles on Public Lands; SWCP 12.10.

**PRACTICE:** 11.10 - Water Well Construction and Management

**OBJECTIVE:** To protect ground water resources from contamination transmitted from water well developments.

**EXPLANATION:** Ground water wells and facilities will be completed in a manner that reduces the potential of contamination of the ground water aquifer. Properly designed well casing programs and above ground well collars will minimize the risk of incidental contamination from grazing livestock and human activities.

**IMPLEMENTATION:** Water well design standards will contain measures to exclude livestock from the immediate vicinity of the well bore and to prevent the accidental or purposeful introduction of toxic substances into the well bore by humans. Protective measures may include grading to direct surface waters away from the well bore, cementing or grouting around the casing pipe, well covers and seals, fencing, and imposing minimum distances between wells and sewage systems. Abandoned wells will be permanently sealed in compliance with local and state requirements.

**REFERENCES:** FSH 2209.22, Structural Range Improvement Handbook; FSH 7409.11, Water Developments and Sanitation Handbook; Engineering Field Manual for Conservation Practices, 1969, U.S. Solid Conservation Service, Chapter 12, springs and Wells'; Recommended Standards for Water Works (Ten States Standards), New York Health Education Service; State Drinking Water Standards; State Well Construction Standards.

**PRACTICE:** 11.11 - Petroleum Storage and Delivery Facilities and Management

**OBJECTIVE:** To protect surface and subsurface soil and water resources from petroleum fluid contamination resulting from leaking petroleum delivery systems and storage facilities.

**EXPLANATION:** Petroleum delivery and storage facilities will be located, designed, constructed, and maintained in a manner that minimizes the potential for contamination of surface and subsurface soil and water resources from leaking flowlines, pipelines and storage tanks. Roads, vegetative manipulation, and other considerations should be evaluated in the construction and maintenance of these facilities.

**IMPLEMENTATION:** The siting and operation of petroleum delivery systems and storage facilities will follow applicable Federal (EPA) and state guidelines and requirements with regard to:

- a. Design/Location.
- b. Construction
- c. Installation.

- d. Operation procedures.
- e. Testing.
- f. Release detection systems.
- g. Recordkeeping requirements.
- h. Leak/spill reporting requirements.
- i. Abandonment.

Storage facilities and delivery systems on National Forest lands will require a license and/or special use permit. Licenses and permits require the project to comply with all State and local standards. Relevant SWCPs from this and other sections may be required: 11.04, 11.05, 11.07, 11.08, 11.10, 13.04, 13.07-13.13, 14.12-14.14, 14.20, 15.01-15.18, 15.21.

REFERENCES: Resource Conservation and Recovery Act of 1976, (90 Stat. 2795), as amended; Underground Storage Tank Regulations (40 CFR part 280); State Hazardous Waste management Plans; FSM 7460.

**PRACTICE: 11.12 - Administrative Site Planning and Management**

**OBJECTIVE:** To locate, design and manage administrative sites to prevent water pollution and other adverse environmental and health impacts.

**EXPLANATION:** Several types of facilities may be located on Forest Service land to facilitate the administration of various programs. These may include Ranger and Research stations, work centers, fire depots and nursery offices. Some facilities include living quarters with wastewater systems. Most include potable water systems. Water quality and potential health impacts should be a major factor in determining the size, type, and location of new or expanded facilities.

**IMPLEMENTATION:** New or expanded facilities should not be located within floodplains, wetlands, or riparian areas. Individual facilities would be located to minimize sediment production and the movement of potential pollutants (oil, gas, and so forth) into surface and ground waters. All potable water and sewage treatment systems will meet State and local standards. Regional Forest Service programs that guide operation and maintenance of wastewater facilities will be implemented by qualified sanitary personnel. Relevant SWCP's from this and other sections may be required: 11.04, 11.05, 11.10, 11.11, 12.04, 12.06, 12.07, 15.26.

**PRACTICE: 11.13 - Sanitary Guideline for Construction of Temporary Labor, Spike, Logging, and Fire Camps and Similar Installations**

**OBJECTIVE:** To eliminate water pollution and other potential environmental and health impacts from the disposal of human waste and wastewater from temporary camps of all types.

**EXPLANATION:** Environmental and health impacts associated with these camps can be adverse if care is not taken to properly plan, locate, and design wastewater facilities. In establishing site locations, sewage disposal consideration should not be overlooked. Despite the sometimes urgent development of a site, wastewater design should be a primary consideration.

This should result in adequate sewage disposal facilities, and little or no health and water pollution threats.

The same applies to the urgent establishment of fire camps. Sufficient care should always be given to the potential impacts associated with human waste and wastewater disposal. Disposal facilities at existing stations or work centers can be overloaded by fire crews. If this occurs, septic tanks may be overloaded, solids may overflow and plug drainfields, and drainfields may be damaged. Surfacing effluent becomes a potential pollution and health hazard.

**IMPLEMENTATION:** Appropriate planning will be required and completed for each site by competent technical resource staffs. Systems will be designed to meet requirements of applicable Federal, State and local regulations. Forest Supervisor approval will be obtained prior to construction.

Wastewater treatment and disposal systems at administrative sites will be evaluated as to their capacity to handle fire, emergency, or other crews. Emergency measures such as chemical toilets and portable showers will be considered as an alternative to use of on-site systems.

Latrines or pits for camps will be located at least 150 feet downstream from the camp, 100 feet from surface water, and 4 feet above high groundwater. Latrines will be replaced with chemical toilets or similar units as soon as practicable.

**REFERENCES:** health and Safety Code Handbook (FSH 6709.11, chapter 7-9); FSM 7420, 7430, and 7440; SWCP 12.04, 12.06, 12.07, and 12.09.

**PRACTICE:** 11.14 - Management of Snow Survey Sites

**OBJECTIVE:** To protect snow courses and related data sites from effects by land management activities.

**EXPLANATION:** Snow survey sites are invaluable for forecasting water yields from mountain watersheds and predicting the availability and timing of streamflow. These sites can consist of snow courses, snow pillows, precipitation gauges, snow depth markers, and soil moisture stations, with or without radio telemetry and radio repeaters. Formal Memorandum of Understanding, special use permits, or other mechanisms have been developed between the Soil Conservation Service (SCS) and Forest Service to protect these sites against activities or disturbing influences that would damage their value.

**IMPLEMENTATION:** During the NEPA process for land disturbing activities, the interdisciplinary team will consult land status records, special use permits, and other sources to insure identification of any snow survey sites within the assessment area. If sites are identified, they will be protected according to the terms of the memorandum of understanding, special use permit, or other mechanism. Line Officers should request assistance from the SCS in designing measures to protect and buffer these sites. The Forest Service and SCS will also cooperate on the elimination of ineffective sites and installation of additional snow courses or sites to improve the reliability of runoff forecasts. If it becomes necessary to conduct activities which may affect a snow course or related data site, Line Officers must consult the SCS and follow the instruction of the agreement.

**REFERENCES:** FSM 2530 and 2720; FSM 1541.1--1 to 7 (FSM 1/97 R-1 Supp. 50) or FSM 2504.2--9 to 16 (FSM 2/79 R-4 Supp. 56).

12 - RECREATION. Recreation on National Forest System lands falls into two general categories, developed and dispersed. Developed recreation is the term used to describe recreation areas that have been designed and built to provide some facilities to the user. These are campgrounds where tables, fire places, toilets, and so forth, have been provided. Recreational residences, resorts, ski areas, and other similar facilities are considered developed recreation.

Dispersed recreation is outdoor recreation use which occurs outside of sites developed or managed for concentrated recreation use. Facilities are, however, sometimes required to safeguard visitors, protect resources, enhance the quality of visitor experiences, and disperse users. Dispersed recreation also includes the table-under-the-tree type of facility, portable toilets in otherwise undeveloped sites, trailheads, and trails.

PRACTICE: 12.01 - Recreation Facilities Planning

OBJECTIVE: To introduce soil and water resource considerations into Recreation Facilities Planning.

EXPLANATION: Recreation facilities include developed sites such as campgrounds, picnic areas, boat ramps, and so forth, and special use facilities such as ski areas, summer homes, and organizational camps. Individual site plans are prepared for each facility.

IMPLEMENTATION: An interdisciplinary team identifies potential impacts to water quality and soil productivity during the NEPA process. The NEPA process identifies mitigating measures needed to protect soil and water resources. Consideration should be given to appropriate location and design of facilities and to the secondary impacts due to continuing use.

REFERENCES: NFMA, MEPA, FSM 2332 and 2333.

PRACTICE: 12.02 - Monitoring and Evaluation of Water Quality at Designated Swimming Sites

OBJECTIVE: To insure the health and safety of water contact recreationists at designated National Forest Swimming Sites.

EXPLANATION: the monitoring and evaluation for bacterial contamination of water quality is recommended at all designated swimming sites. Analysis values are tested against State Water Quality Standards for primary contact recreation.

IMPLEMENTATION: As part of SWCP 11.02, the water quality for swimming sites is monitored and evaluated. If State Standards are exceeded, the area will be closed to all contact recreation use until the cause or causes have been identified and remedied.

Closure is the responsibility of the Forest Supervisor or the District Ranger.

REFERENCES: FSM 2532 and 2335, State Water Quality Standards.

PRACTICE: 12.03 - Sanitary Surveys to Augment the Evaluation of Designated Swimming Waters

OBJECTIVE: To provide information regarding potential hazards or the cause of an existing problem which is a health hazard.

**EXPLANATION:** This practice is designed to augment the monitoring and evaluation of swimming waters (SWCP 12.03). Adjacent areas and the aquatic environment are examined to detect potential or existing health hazards. The survey provides information needed in defining the cause(s) of contamination, if evaluation of swimming waters shows standards have been exceeded.

**IMPLEMENTATION:** A sanitary survey will be made prior to the development of plans for each new swimming facility. All areas where swimming is specifically encouraged or permitted should have a sanitary survey as soon as practical. Subsequent surveys will be repeated periodically. Results of the survey are documented and provided to the Forest Supervisor and District ranger for evaluation and appropriate action.

**REFERENCES:** FSM 2532 AND 2335, SWCP 11.02.

**PRACTICE:** 12.04 - Providing Safe Drinking Water Supplies

**OBJECTIVE:** To provide safe drinking water to Forest Service facilities such as campgrounds, picnic grounds, trailheads, Visitor Information Centers, winter sport areas, and developed roadside facilities.

**EXPLANATION:** Administrative guidelines for water source location and development; testing frequency and limitation for bacteriological, chemical, and physical contaminants; performance of sanitary surveys; closing, correction, and reopening of defective water systems; and documentation of data are provided in the State Drinking Water Standards.

**IMPLEMENTATION:** Location, design, sampling, and sanitary surveys will be performed by qualified individuals who are familiar with drinking water supply systems and requirements. Coordination and cooperation will be pursued with state and local health department representatives in all phases of drinking water system management. Preventive measures will be taken in the location, construction operation, and maintenance of water supply systems to minimize possibilities of contamination.

Sampling and testing of drinking water quality will be required. If State and local health departments do not perform the water analysis, State approved laboratories must be used. When test results indicate that State Standards are exceeded, the water supply will be closed or treatment required until the problem is corrected and satisfactory results are obtained. Seasonal systems will be tested and proven to be satisfactory prior to opening.

**REFERENCES:** Safe Drinking Water Act (P.L. 95-190); State Water Quality Standards; State Drinking Water Standards; 40 CFR Parts 141, 142, and 143; FSH 6709.11, Health and Safety Code Handbook ; FSM 2332, 2333, and 7420; SWCP 11.10 and 12.05.

**PRACTICE:** 12.05 - Documentation of Potable Water Quality Data

**OBJECTIVE:** To assure the availability of water quality data and related information when making analysis and interpretations with respect to potable water systems.

**EXPLANATION:** An inventory of the location of all designated potable water supplies will be prepared and maintained documenting pertinent site information such as dates and results of all water quality tests and surveys. This is an administrative practice of record keeping to establish a record of cause and effect to aid in identifying any sources of contamination.

IMPLEMENTATION: Forests will use the computer-based "Potable Water System Management Program" for site documentation. All laboratory results will be filed on the Forest for a minimum of five years. Data will be stored, edited, and summarized annually.

REFERENCES: FSM 2532, 7421.24, and 7421.25.

PRACTICE: 12.06 - Management of Sanitation Facilities

OBJECTIVE: To protect surface and subsurface soil and water resources from bacteria, nutrients, and chemical pollutants resulting from the collection, transmission, treatment, and disposal of sewage at Forest Service facilities.

EXPLANATION: Toilet facilities are provided at some recreation sites. The type and number depends on site utilization and the capacity of a given site. Sanitation facilities which may vary from a pit toilet to a treatment plant will be planned, located, designed, constructed, operated, inspected and maintained to minimize the possibility of soil and water contamination.

IMPLEMENTATION: The location, design, inspection, operation and maintenance will be performed or controlled by qualified operators who are familiar with sanitation systems and guidelines. State and local authorities should be consulted prior to the installation of new sanitation facilities or modifications of existing facilities to assure compliance with all applicable State and local regulations. Coordination and cooperation should be pursued with State and local Health Departments.

Disposal of sewage at designated sewage treatment plants will be required, when feasible. Where disposal at sewage treatment plants is not feasible, specially designated sites will be identified. These areas will be identified in the disposal contract or agreement.

Sanitary engineers will designate all areas on Forest property where untreated effluent may be disposed of. Sewage should be buried at least 300 feet away from all surface water sources. State and local health departments will be consulted as to concerns, requirements, and regulations.

REFERENCES: FSH 7409.11, Water Developments and Sanitation Handbook; FSM 2331, 2332, 2333, 7430, 7440, and 7460; State and local codes; State Water Quality Standards.

PRACTICE: 12.07 - Control of Refuse Disposal

OBJECTIVE: To protect surface and subsurface soil and water resources from nutrients, bacteria, and chemicals associated with soil waste disposal

EXPLANATION: The users of National Forest recreation facilities are encouraged to cooperate in the proper disposal of garbage and trash. Users are encouraged to burn their combustible trash in fireplaces or stoves. Receptacles are provided for unburnable garbage and trash at some developed sites. Garbage and trash must be packed out by those who use dispersed and wilderness areas.

IMPLEMENTATION: The public education effort is a continuing process accomplished through the use of signs, printed information, mass media, and personal contact. Public cooperation is vital.



Each National Forest will follow their solid waste disposal plan which describes their collection, removal, and final disposal methods. Garbage containers are placed in areas which are convenient for recreationists and are easily maintained. On-site enforcement may be necessary.

The final disposal of collected garbage will be at a properly designed and operated sanitary landfill. Each landfill site will be located where groundwater and surface waters are at a safe distance as prescribed by State and local codes.

REFERENCES: FSM 2332, 2333, and 7460; State and local codes.

PRACTICE: 12.08 - Assuring Proper Sanitation and Water Supplies For Special Use Facilities

OBJECTIVE: To protect the quality of water both consumed by and discharged from facilities under Special Use Permit.

EXPLANATION: Special Use facilities must comply with State and local sanitation ordinances. Buildings and grounds will be supplied with at least the minimum sanitary facilities required by local codes. Water systems must provide an adequate volume of acceptably pure water for drinking, cooking, and general sanitation. Structures designed with toilets, showers, and wash basins will be planned to serve the facility's needs and capacity.

IMPLEMENTATION: Management controls and requirements protecting water quality through installation and maintenance of proper sanitation and water supply facilities will be incorporated into the Special Use Permit for the facility. Permittees are required to inspect water supply and proper sanitation. Copies of the test results will be provided to the appropriate Forest Officer, as specified in the Special Use Permit.

REFERENCES: FSM 2342 and 2343; SWCP 11.08, 12.04, 12.06 and 12.07; State Water Quality and Drinking Water Standards.

PRACTICE: 12.09 - Sanitation at Hydrants and Water Faucets Within Developed Recreation Sites

OBJECTIVE: To maintain water quality standards around hydrants and faucets which provide water for consumptive use in developed recreation sites.

EXPLANATION: This practice prohibits the cleaning or washing of any personal property, fish, animal, or food at a hydrant or at a water faucet not provided for that purpose. The public must be informed of their responsibilities concerning sanitary regulations.

Acceptable designated areas are those that are located away from consumptive water sources and where effluent from the washing operation can be disposed of properly.

IMPLEMENTATION: The authorized Forest Officer will inform the public of their sanitary responsibilities by posting signs on bulletin boards or at hydrants or faucets, by notices in newspapers, and by personal contact. On-site enforcement by the Forest Officer may be necessary for violators.

REFERENCES: FSM 2334, 7410, and 7430.

PRACTICE: 12.10 - Management of Off-Road Vehicle Use

**OBJECTIVE:** To control Off-Road Vehicle (ORV) use which is causing soil erosion and adverse effects on water quality and to identify corrective measures.

**EXPLANATION:** Areas or trails where ORV use is causing degradation of water quality or soil erosion should be identified. It should be determined through monitoring and evaluated if degradation is beyond acceptable limits, as defined by Forest Plans.

**IMPLEMENTATION:** Monitoring results will be evaluated against Forest Plan standards for soil and water resources and the management objectives for the area. If considerable adverse effects are occurring or are likely to occur, corrective action should be taken (SWCP 11.03). Corrective actions may include, but are not limited to, redistribution in the amount of ORV use, development of a Forest-wide Travel Plan, signing or barriers to redistribute use, partial closing of areas, rotation of use on areas, closure to causative vehicle types or total closure, and structural solutions such as culverts and bridges.

Closure is done by authority of the Forest Supervisor (SWCP 11.09).

**REFERENCES:** SWCP 11.02; EO 11644, Use of Off-Road Vehicles on the Public Lands, and EO 11989, Off Road Vehicles on Public Lands; 36 CFR 295.5; FSM 2352 and 2355.

**PRACTICE:** 12.11 - Protection of Water Quality Within Developed and Dispersed Recreation Areas

**OBJECTIVE:** To protect water quality by regulating the discharge and disposal of potential pollutants.

**EXPLANATION:** This practice prohibits placing in or near a stream, lake, or other waterbody, materials or substances which may degrade water quality. The actual safety distance from each water body is at least 100 feet, or greater if warranted by local conditions.

This includes, but is not limited to, human and animal waste, oil, and other hazardous substances. Areas may be closed in order to restrict use in problem areas.

**IMPLEMENTATION:** Within developed sites, authorized Forest Officers will inform the public of their responsibility through signs, bulletin boards, newspapers or personal contact. Pamphlets, brochures and other material will be used to encourage public cooperation in protecting water quality in dispersed areas. Forest Officers can issue citations to violators.

**REFERENCES:** FSM 2323, 2332, 2333, 2334, 2335, and 2502; SWCP 11.02 and 11.07; FSH 2309.19, Wilderness Management Handbook.

**PRACTICE:** 12.12 - Location of Pack and Riding Stock Facilities in Wilderness, Primitive, and Backcountry Areas

**OBJECTIVE:** To avoid degradation of water quality from pack and riding stock facilities.

**EXPLANATION:** This practice directs the location of pack and riding stock facilities at safe locations away from springs, streams, lakes, wet meadows, and any other surface waters.

Public education is essential to establish acceptable use patterns. Signs, brochures, organized public education programs, and personal contacts will be used to gain compliance. Wilderness patrolmen will check compliance with use.

REFERENCE: FSM 2323.63; FSH 2309.19, Wilderness Management Handbook.

13 - VEGETATION MANAGEMENT. Vegetation management on National Forest System lands is conducted in the course of forest regeneration, brushland conversion to grass for fuels reduction, brushland conversion to forests, utility transmission corridor maintenance, rangeland improvement, water yield improvement, and wildlife habitat improvements. Means of conversion are: chemical, mechanical, burning, and biological. Each project is evaluated through the NEPA process by an interdisciplinary team.

PRACTICE: 13.01 - Operation Seeding and Land Preparation Equipment on the Contour

OBJECTIVE: To reduce soil erosion and losses in soil productivity and to minimize sediment production and turbidity.

EXPLANATION: This measure is implemented to provide a means of rapid infiltration and surface water detention, so that infiltration can take place. The factors evaluated are slope, infiltration rate, permeability, soil depth, climatic variables, and soil water holding capacity. These field evaluations are made by technical staffs during project planning.

IMPLEMENTATION: Appropriate contract provisions and/or management controls are identified in the NEPA process. The project supervisor is responsible for enforcing these management requirements that deal with contour operations on In-Service projects. The Contractor is responsible for enforcing provisions of contracts. Contour operations, where limited by steepness of slope (usually greater than 30 percent), may require other methods of stabilization such as hydroseeding or hand operations.

REFERENCES: FSM 2245 (National Grasslands), see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 13.02 - Slope Limitations for Tractor Operation

OBJECTIVE: To reduce gully and sheet erosion and associated sediment production.

EXPLANATION: This measure limits surface disturbance and keeps surface runoff water from concentrating. This practice restricts tractor operation to slopes where corrective measures for proper drainage such as water bars are easily installed and effective. Criteria that may be used to determine slope restrictions are soil stability, mass stability, infiltration rate, and soil water holding capacity. This data may be interpreted from soil and landtype inventories, geologic maps, and climatic and hydrologic information. Subsequent field verification may be necessary.

IMPLEMENTATION: Recommended provisions and management controls for operating machinery on steep slopes is identified during the NEPA process. These provisions should be included in the contract. The contracting Officer is responsible for ensuring implementation of these contract provisions. For In-Service projects, the project supervisor is responsible for enforcement of management requirements and for identification of additional areas where operations should be limited.

REFERENCES: SWCP 14.07; See references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 13.03 - Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows

**OBJECTIVE:** To limit soil damage, turbidity, and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion.

**EXPLANATION:** This practice is designed to prevent soil puddling, compaction and displacement, and the concentration of surface water and soil erosion, which may lead to rill or gully erosion and subsequent water quality degradation. This measure is intended to prevent or reduce the need for corrective measures to solve water concentration problems due to tractor use.

**IMPLEMENTATION:** Application is mandatory on all vegetation manipulation projects unless specifically excluded in the NEPA process. Contract specifications and controls and requirements are identified in the environmental analysis. The project supervisor and/or Contracting Officer are responsible for identifying wetlands and meadows not previously recognized in the NEPA process, and for following management controls and contract provisions pertaining to wetlands and meadows.

**REFERENCES:** EO 11990, protection of Wetlands; FSM 2527; SWCP 11.05 and 14.16; see references in "Best Management Practice" Definition (05--2 and 3).

**PRACTICE:** 13.04 - Revegetation of Surface Disturbed Areas

**OBJECTIVE:** To protect soil productivity and water quality by minimizing soil erosion.

**EXPLANATION:** This practice is used to stabilize the surface of the disturbed area through the influence of vegetation. The vegetation will be selected to meet many or most of the management objectives for the area; range, wildlife, timber, fuels, minerals, aesthetics, and so forth. Grass or browse species may be seeded between recently planted trees for erosion prevention, wildlife habitat enhancement, or other management needs.

The factors evaluated are soil fertility, slope, aspect, landtype characteristics, soil water holding capacity, climatic factors, vegetation species characteristics, and project objectives. These are filed determinations and office interpretations made by an interdisciplinary team.

**IMPLEMENTATION:** The identification of disturbed areas and species mix will be determined during the NEPA process. The responsible Line Officer assigns specific individuals to execute the project. Projects are subsequently monitored to assess the revegetation effectiveness, and need for follow-up action.

**REFERENCES:** FSM 2522, 2405, 2472, and 7721; SWCP 11.02, 11.03, and 14.13; see references in "Best Management Practice" Definition (05--2 and 3).

**PRACTICE:** 13.05 - Soil Protection During and Following Slash Windrowing

**OBJECTIVE:** To prevent removal or severe disruption of the productive surface soil and to minimize losses from erosion.

**EXPLANATION:** Windrowing is a common method of slash treatment removal and surface scarification. On slopes the material should be windrowed on the contour to act as a filter barrier which catches sediment and detains runoff water. On many forest soils, great care must be taken to preserve the surface soil layer during the windrowing operation.

IMPLEMENTATION: Recommendations on slash windrowing are identified during the NEPA process. The project supervisor is responsible for enforcing applicable management requirements. The Contracting Officer is responsible for enforcing contract clauses.

REFERENCES: SWCP 13.01; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 13.06 - Soil Moisture Limitations for Tractor Operation

OBJECTIVE: To minimize soil compaction, puddling, rutting, and gulying with resultant sediment production and loss of soil productivity.

EXPLANATION: This measure minimizes surface disturbance during high soil moisture conditions which would result in compaction, puddling, rutting, and gulying problems. This practice reduces the need to correct these soil and water resource problems later. Soil erodibility, compatibility, climatic factors, soil/water relationships, and mass stability are factors that are used to evaluate tractor limitations during the NEPA process.

IMPLEMENTATION: Contract provisions and management requirements for soil moisture limitations are identified during the environmental analysis. The project supervisor and/or Contracting Officer are responsible for determining when the soil surface is unstable and susceptible to damage and is then responsible for suspending or terminating operations.

REFERENCES: FSM 2522; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981.

PRACTICE: 13.07 - Pesticide Use Planning

OBJECTIVE: To incorporate water quality and hydrologic considerations into the Pesticide Use Planning Process.

EXPLANATION: The pesticide use planning process will be used to identify problem areas and the objectives of the project, establish the administrative controls, identify treatments and preventive measures, and incorporates the hydrologic considerations contained in SWCP 13.08 through 13.13. The NEPA process addresses these considerations in terms of impacts, mitigation measures, and alternative treatment measures. Project work and safety plans specify management direction.

Factors considered in pesticide selection are: purpose of the project, application methods available, target species, timing of treatment, pest locations, size of treatment area, and need for repeated treatment. Practicability of application considers: registration restrictions, form and method of application, topographic relief and areas to be avoided, and social acceptance of the project. The degree of risk considers: hazard to humans, method of application, transportation and handling hazards, carriers needed, and chemical persistence.

IMPLEMENTATION: The interdisciplinary team evaluates the project in terms of potential site response, potential social and environmental impacts, mitigating measures needed to protect water quality, and the need and intensity of monitoring and evaluation. The responsible Line Officer then prepares the necessary NEPA documentation, Project Plan, and Safety Plan. Depending on the pesticide use, (FSM 2151.04) the Forest pesticide-use coordinator or Integrated pest Management Working Group or Regional IPMWG reviews the documents along with the

Pesticide-Use Proposal, form FS-2100-2, and makes recommendations for or against approval of the project.

REFERENCES: NFMA; NEPA; FSM 2150 and 2323; State Hazardous Waste Management Plans; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 13.08 - Apply Pesticides According to Label and EPA Registration Directions

OBJECTIVE: To avoid water contamination by complying with all label instruction and restrictions.

EXPLANATION: Label directions for each pesticide are detailed and specific, and include legal requirements for use.

IMPLEMENTATION: Constraints identified on the label and other legal requirements of application are incorporated into project plans and contracts. Responsibility for ensuring that label directions and other applicable requirements are followed rests with the Forest Supervisor or a designate such as the Forest Pesticide Use Coordinator. For contracted projects, it is the responsibility of the Contracting Officer to ensure that label directions and all other requirements are followed.

REFERENCES: FSM 2150; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 13.09 - Pesticide Application Monitoring and Evaluation

OBJECTIVE: To determine and document that pesticides have been applied safely and to provide an early warning for any contamination of water or non-target areas or resources.

EXPLANATION: This practice provides feedback on the placement accuracy, application amount, and any water contamination that might occur from pesticide use, so as to minimize or eliminate hazards to non-target areas or resources. Monitoring and evaluation methods include spray cards, dye tracing, and direct measurement of pesticide in or near water. Type of pesticide, equipment, application difficulty, public concern, beneficial uses, monitoring difficulty, availability of competent laboratory analysis and applicable Federal, State, and local laws and regulations are factors considered when determining the monitoring and evaluation needs.

IMPLEMENTATION: The monitoring and evaluation of pesticide application is a component of SWCP 11.02. The need for a monitoring plan is identified during the Pesticide Use Planning Process/NEPA process. If determined necessary, this monitoring and evaluation plan will consider the same items as in SWCP 11.02. A technical staff familiar in pesticide monitoring will evaluate and interpret the monitoring results in terms of compliance, State water quality standards and adequacy of project specifications.

REFERENCES: FSM 2150; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 13.10 - Pesticide Spill Contingency Planning

OBJECTIVE: To reduce contamination of water from accidental pesticide spills.

**EXPLANATION:** A contingency plan that contains a predetermined organization and immediate actions to be implemented in the event of a hazardous substance spill will be prepared. The plan lists notification requirements, time requirements for the notification, how spills will be handled, and who will be responsible for clean-up. Factors considered for each spill are: specific substance spilled, quantity, toxicity, proximity of spill to waters, and the hazard to life, property, and the environment.

**IMPLEMENTATION:** The Pesticide Spill Contingency Plan will be incorporated into the Project Safety Plan. The NEPA process will provide the means for including public and other agency involvement in plan preparation. The plan will list the responsible authorities.

**REFERENCES:** SWCP 11.07; FSH 2109.12, Pesticide Storage, Transportation, Spills, and Disposal Handbook; FSM 6740, 7442, 7442, and 7460; Oil and Hazardous Substances Pollution Contingency Plan for EPA Regions 8 and 10, 7/26/85; R-1 and R-4 Emergency and Disaster Plan; see references in "Best Management Practice" Definition (05--2 and 3).

**PRACTICE:** 13.11 - Cleaning and Disposal of Pesticide Containers and Equipment

**OBJECTIVE:** To prevent water contamination and risk to humans from cleaning and disposal of pesticide containers.

**EXPLANATION:** The cleaning and disposal of pesticide containers and equipment must be done in accordance with Federal, State, and local laws, regulations, and directives, and in a manner which will safeguard public health, the beneficial uses of water, aquatic organisms and wildlife. Containers are rinsed three times, the rinse water applied on the project area as soon as practical, and the containers taken to the designated disposal site. Application equipment is also rinsed and rinse water applied to the project site before the equipment is moved from the project area.

**IMPLEMENTATION:** When the pesticide is applied by In-Service personnel, the Forest or District Pesticide Use coordinator will locate proper rinsing and disposal sites, and will arrange for container disposal in an approved disposal site. When the pesticide is applied by a contractor, the contractor is responsible for proper clean-up and container disposal in accordance with label directions and Federal, State, and local laws.

The Project Contracting Officer will document that the proper disposal methods were followed.

**REFERENCES:** FSM 2150; FSH 2109.12, Pesticide Storage, Transportation, Spills, and Disposal Handbook; FSH 6709.11, Health and Safety Code Handbook; FSH 6709.12, Safety and Health Program Handbook; SWCP 11.07 and 11.08; see references in "Best Management Practice" Definition (05--2 and 3).

**PRACTICE:** 13.12 - Protection of Water, Wetlands, and Riparian Areas During Pesticide Spraying

**OBJECTIVE:** To minimize the risk of a pesticide entering surface or subsurface waters or affecting riparian areas, wetlands, and other non-target areas.

**EXPLANATION:** When applying pesticides, an untreated buffer strip will be left alongside surface waters, wetlands, and riparian areas. Factors considered in establishing buffer strip widths beyond minimums established by FSM and NEPA documents are: beneficial water uses, adjacent land use, rainfall, temperature, wind speed, wind directions, terrain, slope, soils and

geology, vegetative type, and aquatic life. Other considerations include: persistence, mobility, toxicity, and formulation of the pesticide, method of applications, equipment used, spray patterns, droplet size, application heights, and application pattern.

**IMPLEMENTATION:** Protected areas will be identified and mapped by an interdisciplinary team and the Forest Pesticide Use Coordinator during the NEPA process. Protection of untreated areas is the responsibility of the project supervisor for In-Service projects and the Contracting Officer for contracted projects. The certified commercial applicators are briefed about location of protection areas. These areas are flagged or otherwise marked when necessary to aid in boundary identification.

**REFERENCES:** FSM 2526, 2527, 2245, AND 2150; see references in "Best Management practice" Definition (05--2 and 3).

**PRACTICE:** 13.13 - Controlling Pesticide Drift During Spray Application

**OBJECTIVE:** To minimize the risk of pesticide contaminating non-target areas.

**EXPLANATION:** Pesticide spray applications will be accomplished according to a prescription that specifies the following: areas to be left untreated, buffer areas, type of spray and associated materials, equipment and method to be used, droplet size, spray height, application pattern, flow rate, terrain and meteorological considerations. Hand spraying, with less associated risk, will have fewer application restrictions for drift control than aerial applications.

**IMPLEMENTATION:** The prescription is prepared by an interdisciplinary team and the Forest or District Pesticide Use Coordinator during the NEPA process. The Line Officer is responsible for designating a project supervisor who is responsible for ensuring that the prescription is followed during application and for terminating application if the standards are exceeded.

**REFERENCES:** FSM 2150 and 2245; SWCP 13.12; see references in "Best Management Practice" Definition (05--2 and 3).

**14 - TIMBER.** Timber harvesting and reforestation are the culmination of several years of timber resource assessment and detailed project planning. The actual physical activities consist of felling, bucking, skidding, yarding, loading and hauling, site preparation, tree planting, and other activities associated with stand establishment.

Planning generally starts 5 to 10 years before the timber is sold for harvesting. First, the land must be suitable for and allocated to timber resource activities in the Forest Plan. The proposed sale must follow the standards, guidelines, and direction within the Forest Plan. Next, a cumulative effects feasibility analysis is conducted prior to including the project on the implementation schedule to ensure that the project will not impact soil, water, and other resources beyond acceptable limits. A position statement is then prepared which documents the intent and schedule to harvest and offers tentative harvesting alternatives. The harvest proposal is next considered by an interdisciplinary team which conducts an environmental analysis. Based on the analysis results, the appropriate NEPA document which is tiered to the Forest Plan is prepared documenting the estimated effects of the proposed timber project. This is used by the appropriate Line Officer in decision making. When the sale plan is approved, the timber project is implemented under terms of this decision. The Timber Sale Contract and appraisal are then prepared by using contract provisions that were selected to satisfy management constraints and mitigation measures in the environmental analysis. The timber is now advertised and sold to the



successful bidder. Finally, the terms of the Timber Sale Contract, including harvesting, are administered on the ground by the certified Sale Administrator and Forest Service Representative.

Success of a good harvest is measured by comparing the on-the-ground results to the management objectives and constraints identified and addressed in the environmental analysis and Forest Plan.

**PRACTICE:** 14.01 - Timber Sale Planning

**OBJECTIVE:** To incorporate soil and water resource considerations into Timber Sale Planning.

**EXPLANATION:** Timber Sale Planning is accomplished through the NEPA process. The environmental analysis will evaluate the potential for impacts to and the cumulative effects on the soil and water resources. If a significant potential exists, the environmental analysis will: (1) consider how to minimize potential effects during and following the sale layout and subsequent logging operations; (2) include mitigation of effects for those treated areas where impacts are unavoidable; (3) and identify environmentally sensitive areas where impacts from proposed treatments can not be mitigated to conform with standards.

**IMPLEMENTATION:** During the NEPA process, an interdisciplinary team will evaluate watershed characteristics and estimate response of soil and water resources to proposed timber harvest and related activities. The NEPA process identifies mitigating measures needed to protect soil and water resources. The subsequent contract will include provisions to meet water quality, soils, and other resource protection requirements as directed by the environmental analysis.

**REFERENCES:** NFMA; NEPA; FSM 1950, 2431.1, 2431.2, 2511, and 2531; the Timber Sale Contract; individual Forest Plans; SWCP 11.01, 11.02, 11.03, 11.04, 11.05, 11.06, 11.07, and 11.14; FSH 2409.18, Sale Preparation Handbook.

**PRACTICE:** 14.02 - Timber Harvest Unit Design

**OBJECTIVE:** To ensure that timber harvest unit design will secure favorable conditions of water flow, maintain water quality and soil productivity, and reduce soil erosion and sedimentation.

**EXPLANATION:** This is an administrative and preventive practice. The proposed timber harvest units are evaluated to estimate the response on the affected watersheds. This involves field examination, utilization of existing data, analysis of potential watershed response (that is, water yield and sediment yield analysis), and professional judgment. Characteristics to be evaluated can include: (1) the recovery from past harvests; (2) the allowable area that can be harvested; (3) the protection of stream channels; (4) the erosion potential of the area; (5) landform characteristics; (6) the number, size, shape, and location of harvest units; (7) estimated location and size of roads and skid trails; (8) logging system design; and (9) the potential natural recovery rate of the watershed. Where adverse water quality and soil productivity impacts or undesirable streamflows may result, the harvest unit design should be modified, individual units deleted, and/or the natural recovery rate accelerated by using watershed improvement measures.

**IMPLEMENTATION:** The watershed evaluation of proposed timber harvest is accomplished by the interdisciplinary team during the NEPA process of Timber Sale Planning. Prescriptions to

assure acceptable protection of soil and water resources are incorporated into the environmental analysis. On-the-ground accomplishment of the direction in the environmental analysis is carried out by the Presale Forester, the certified Sale Administrator, the Project Engineer, and the administrator of post sale slash disposal and cultural activities, with review by technical resource staffs. The need for monitoring and evaluation will be identified in the environmental analysis when necessary.

REFERENCES: NFMA (Section 3091-6 F, III-V, and Section 219.10); FSH 2409.15, Timber Sale Administration Handbook, and FSH 2409.18, Sale Preparation Handbook; FSM 2471 and 2409.13; SWCP 11.01, 11.02, 11.03, and 11.134.

PRACTICE: 14.03 - Use of Sale Area Maps for Designating Soil and Water Protection Needs

OBJECTIVE: To delineate the location of protection areas and available water sources and to insure their recognition, proper consideration, and protection on the ground.

EXPLANATION: The following features are designated on the Sale Area Map (and described in associated contract provisions), which is an integral part of the Timber Sale Contract.

- a. Location of stream courses to be protected (perennial, intermittent, and ephemeral).
- b. Wetlands and Riparian Areas (meadows, lakes, pot holes, and so forth) to be protected.
- c. Boundaries of harvest units.
- d. Specified roads.
- e. Roads where log hauling is prohibited or restricted.
- f. Structural improvements.
- g. Areas for different skidding and yarding methods.
- h. Sources of rock for road work, riprapping, and so forth.
- i. Water sources available for Purchaser's use.
- j. Other features required by Division "C" contract Provisions.
- k. Domestic or public water supply source.

IMPLEMENTATION: The interdisciplinary team identifies and delineates these and other features on maps which are included in the project design along with a discussion of each feature. The Presale Forester includes them on the Sale Area Map at the time of contract preparation. The features are reviewed on the ground by the Purchaser and the certified Sale Administrator prior to harvesting.

REFERENCES: Timber Sale Contract Provisions B1.1, B6.5, B6.6, C6.51 (R-1); FSM 2431.1 - .3 and 2471; FSH 25409.15, Timber Sale Administration Handbook and FSH 2409.18, Sale Preparation Handbook.

PRACTICE: 14.04 - Limiting the Operating Period of Timber Sale Activities

OBJECTIVE: To minimize soil erosion and sedimentation and loss in soil productivity by insuring that the Purchaser conducts their operations, including erosion control work, road maintenance, and so forth, within the time period specified in the Timber Sale Contract.

EXPLANATION: Timber is purchased by individuals or companies who either harvest the timber themselves or contract harvest to other parties. Therefore, it is necessary to insure that purchasers understand and adhere to soil and water resource recommendations determined in the NEPA process. This is accomplished by setting forth the Purchaser's responsibilities in the Timber Sale Contract.

The C6.3 "Plan of Operation" provision is required in all timber Sale Contracts. This provision states that the Purchaser must submit a general plan of operation which will set forth planned periods for and methods of road construction, timber harvesting, completion of slash disposal, erosion control work, and other contractual requirements. Forest Service written approval of the Plan of Operation is a prerequisite to commencement of the Purchaser's operation.

The contract provision B6.31 "Operation Schedule" requires that the Purchaser shall provide an annual schedule of anticipated activities such as road maintenance and erosion control work.

Contract provision C6.31 "Limited Operating Period" may be used in a contract to limit the Purchaser's operations to specified periods of the year. Provision B6.6 can be used to control operations because of wet weather, high water, and so forth, in order to protect resources.

IMPLEMENTATION: Limited operating periods are identified and recommended during the environmental analysis by the interdisciplinary team. The Presale Forester prepares the contract to include provision C6.31. Provisions B6.3, B6.31, and C6.3 are all mandatory provisions of the timber Sale contract. Provision C6.3 is only mandatory for sales over a two year contract period. The Purchaser must submit his general plan and annual plans to the Forest Service. The Purchaser may commence operations only after written Forest Service approval of the general plan under C6.3.

REFERENCES: Timber Sale Contract Provisions B6.3, B6.31, B6.65, B6.6, C6.3; FSM 2451 and 2453.2; FSH 2409.18, Sale Preparation Handbook.

PRACTICE: 14.05 - Protection of Unstable Areas

OBJECTIVE: To protect unstable areas and to avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.

EXPLANATION: This management practice is an administrative and preventive control. Where unstable areas cannot be managed without irreversible effects, they are taken out of suitable forest land base in the Forest Plan and are reclassified as unsuitable forest land. Using existing harvesting technologies, these lands are not managed for timber production because irreversible damage to soil productivity or watershed conditions would result. Timber harvesting is deferred until improved harvesting technologies are developed and proven.

IMPLEMENTATION: The interdisciplinary team during the environmental analysis identifies unstable areas by utilizing input provided by various technical resource staffs. Where unstable areas are presently classified as suitable forest lands and harvest cannot be designed without causing irreversible effects, they are changed to the classification of unsuitable forest lands. If

the interdisciplinary team determines that current or prospective logging methods would result in unacceptable watershed impact, the harvest is deferred.

REFERENCES: FSM 2405.13.

PRACTICE: 14.06 - Riparian Area Designation

OBJECTIVE: To minimize the adverse effects on Riparian Areas with prescriptions that manage nearby logging and related land disturbance activities.

EXPLANATION: The Riparian Area is not a zone of exclusion, but an area of closely managed activity. It acts as (1) an effective filter and absorptive zone for sediment; (2) maintains shade; (3) protects aquatic and terrestrial riparian habitats; (4) protects channel and streambanks; and (5) promotes floodplain stability. As a preventive measure, roads, skid trails, landings, and other timber harvesting facilities will be kept out of these areas when feasible or at a prescribed distance from streams and wetlands. Factors such as stream class, channel stability, sideslope steepness, slope stability, resources dependent on these areas, and standards, guidelines, and direction from Forest Plans are considered in determining the management of activities and width of Riparian Areas. Fisheries habitat condition and its estimated response to the proposed timber sale are also evaluated.

IMPLEMENTATION: The Riparian Area requirements are identified during the environmental analysis by the interdisciplinary team. The timber sale project is designed to include site specific recommendations for the prevention of sedimentation and other stream damage from logging activities. The environmental analysis will provide for planning of harvests to insure long-term health and revegetation of the Riparian Areas, while meeting shading, debris recruitment, and other management objectives. As appropriate, monitoring and evaluation will be identified in the environmental analysis documentation. The Presale Forester is responsible for the inclusion of the Riparian Areas in the Timber Sale Contract and on the Sale Area Map. The certified Sale Administrator is responsible for contract compliance during harvest operations.

REFERENCES: FSM 2405.13, 2453.2, 2526, and 2471, NEPA; NFMA; Timber Sale Contract Provision C6.5 (R-1), C5.421; SWCP 11.02, 11.05, 13.03, and 14.03; FSH 2409.15, Timber Sale Administration Handbook and FSH 2409.18 Sale Preparation Handbook; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 14.07 - Determining Tractor Loggable Ground

OBJECTIVE: To protect water quality from degradation caused by tractor logging ground disturbance.

EXPLANATION: This practice is intended to minimize soil erosion and subsequent sedimentation and water quality degradation. Tractor loggable ground is a product of local slope limitations, the volume of timber to be harvested from the site, and the soil, land type, geologic, climatic, and hydrologic characteristics of the site. On-the-ground reconnaissance may be necessary.

IMPLEMENTATION: The determination of tractor loggable ground is performed by the interdisciplinary team during the transportation planning portion of the Timber Sale Planning Process. The results of this determination are presented in a NEPA document. These results are considered during the selection of logging and silvicultural methods and are used in determining

the intensity of and restrictions for land disturbance activities, Provisions in the Timber Sale Contract specify the areas and conditions upon which tractors can operate (such as, requiring tractor logging on snow in riparian areas).

REFERENCES: 14.08 - Tractor Skidding Design

OBJECTIVE: To minimize erosion and sedimentation and protect soil productivity by designing skidding patterns to best fit the terrain.

EXPLANATION: This is a preventive practice. The watershed factors that are considered include slope, aspect, soil stability, vegetative cover, Riparian Areas, meadows, and other factors that may affect the flood and sediment yield potential of the land. The careful control of skidding patterns serves to avoid onsite and downstream channel impacts, the build up of destructive runoff flows, erosion in sensitive watershed areas such as meadows and Riparian Areas, and a reduction in soil productivity.

Two complementary methods of protecting soil and water resources by tractor skid trail design are:

- a. End-Lining. This method involves winching the log directly out of the sensitive areas (such as meadows and Riparian Areas) with a cable operated from outside the sensitive area. In this manner, logs can be removed from the sensitive areas while avoiding encroachment by heavy equipment and associated site damage.
- b. Felling to the Lead. This method involves felling trees toward a predetermined skid pattern. This procedure facilitates an uncomplicated approach of the tractor operating between the log and the skid trail. Soil disturbance and compaction are consequently lessened and residual stand and site impacts are minimized.

IMPLEMENTATION: For skid trail design, sensitive areas are identified and evaluated in the environmental analysis during the Timber Sale Planning Process. If necessary, prescriptions can be included in the Timber Sale Contract through the use of a special provision. The certified Sale Administrator then executes the prescription on the ground by locating the skid trails with the timber purchaser or by agreeing to the Purchaser's proposed locations prior to construction.

REFERENCES: Timber Sale Contract Provision B6.422, B6.424, and C6.6; FSM 2524 and 2451; FSH 2409.18, Sale Preparation Handbook and FSH 2409.15, Timber Sale Administration handbook; see references in "Best Management Practice" Definition (05--2 and 3); in R-4, R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981.

PRACTICE: 14.09 - Suspended Log Yarding in Timber Harvesting

OBJECTIVES: To protect the soil from excessive disturbance and accelerated erosion and to maintain the integrity of the Riparian Area and other sensitive watershed areas.

EXPLANATION: Suspended log yarding includes all yarding systems which suspend logs either partially or wholly off of the ground. These systems include hilead, skyline, helicopter, and balloon yarders. The systems are used on steep or unstable slopes and in Riparian Areas where tractors cannot operate. All of the systems result in less soil disturbance since heavy machinery is not used over the sale area. In most cases, these systems require fewer roads because of longer skidding distances. Fewer roads and less soil disturbance will result in less impact on the soil and water resource.

**IMPLEMENTATION:** Areas where suspended log yarding is to be used are determined and identified in the environmental analysis. The specific systems are included in the contract and designated on the Sale Area Map by the Presale Forester. The certified Sale Administrator oversees the project operation using the guidelines and standards established in the Timber Sale Contract with reference to the environmental analysis documentation.

**REFERENCES:** Timber Sale Contract Provisions B6.42 and C6.4; FSH 2409.18, Sale Preparation handbook and 2409.15, Timber Sale Administration Handbook; see references in "Best Management Practice" Definition (05--2 and 3); in R-4, R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981.

**PRACTICE:** 14.10 - Log Landing Location and Design

**OBJECTIVE:** To locate landings in such a way as to avoid soil erosion and water quality degradation.

**EXPLANATION:** This practice is both administrative and preventive. Location of all landing clearing limits shall be agreed to by the Forest Service and Purchaser prior to construction. The following criteria are used in evaluating landings:

- a. The cleared or excavated size of landings shall not exceed that needed for safe and efficient skidding, decking, and loading operations. Every landing must meet the safety requirements of the Occupational Safety and Health Administration.
- b. Where a choice exists, landing locations are selected which involve the least amount of excavation and the least erosion potential.
- c. Where possible, landings are located near the points of ridges so that felled timber lying between drainages can be skidded to the landing without crossing channels or impacting Riparian Areas.
- d. Landings are located where the least number of skid roads are required and sidecast will neither enter drainages nor damage other sensitive areas.
- e. If possible, landings are positioned such that the skid road approach will be nearly level.
- f. Locate landings to minimize the number of tractor roads entering a given landing.
- g. Some landings are designed and constructed as part of specified roads.
- h. Landings are shaped to drain in a planned direction and manner to minimize erosion and sediment delivery to stream courses.
- i. Major landings, such as those for helicopter logging, are treated to restore soil infiltration rates when use is completed.

**IMPLEMENTATION:** Landing locations chosen by the Purchaser must be agreed to by the certified Sale Administrator. The Sale Administrator can negotiate with the Purchaser's representative to select mutually acceptable landing locations. Acceptable lands must meet the above criteria. Should agreement not be reached, the decision of the Forest Service shall prevail within the limitations of law.

REFERENCES: Timber Sale Contract Provisions B6.422; FSH 2409.15, Timber Sale Administration Handbook; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981.

**PRACTICE: 14.11 - Log Landing Erosion Prevention and Control**

**OBJECTIVE:** To reduce the impacts of erosion and subsequent sedimentation from log landings through the use of mitigating measures.

**EXPLANATION:** This practice employs administrative, preventive, and corrective controls to meet the objective. Timber Sale Contract requirements provide for erosion prevention and control measures on all landings. Provisions are made in the Timber Sale Contract for landings to have proper drainage. After landings have served the Purchaser's purpose, the Purchaser shall ditch or slope the landings to permit the drainage and dispersion of water. Provisions are also made for revegetation. Other provisions may include scarifying, smoothing and sloping construction of drainage ditches, prevention of water draining off roads from reaching a landing, spreading slash, covering with wood chips, or applying straw mulch. Unless agreed, cut and fill banks around landings shall be sloped to remove overhangs and otherwise minimize erosion. The specific work needed on each landing will depend on the actual ground conditions.

**IMPLEMENTATION:** The Presale Forester and certified Sale Administrator assess the need for stabilization with technical resource staff input as needed. It is the responsibility of the certified Sale Administrator to insure that this practice is properly implemented on the ground.

REFERENCES: Timber Sale Contract Provisions B6.6, B6.63, B6.422, C6.4, C6.6, C6.601; FSM 2405.13; FSH 2409.15, Timber Sale Administration Handbook; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981.

**PRACTICE: 14.12 - Erosion Prevention and Control Measures During Timber Sale Operations**

**OBJECTIVE:** To ensure that the Purchaser's operations shall be conducted reasonably to minimize soil erosion.

**EXPLANATION:** timber is purchased by individuals or companies who either harvest the timber themselves or contract harvest to other parties. Therefore, it is necessary to insure that purchasers understand and adhere to soil and water resource prescriptions arrived at in the Timber Sale Planning Process. This is accomplished by setting forth the Purchaser's responsibilities in the Timber Sale Contract.

**IMPLEMENTATION:** Equipment shall not be operated when ground conditions are such that excessive impacts will result. The kinds and intensity of control work done by Purchaser shall be adjusted to ground and weather conditions and the need for controlling runoff. The certified Sale Administrator is responsible for insuring that the Purchaser conducts his operations according to the Timber Sale contract. Erosion control work shall be kept current immediately preceding expected seasonal periods of precipitation or runoff. If the Purchaser fails to do erosion control work prior to any seasonal period of precipitation or runoff, the Forest Service may temporarily assume responsibility for the work and any unencumbered deposits (performance bonds) may be used by the Forest Service to do the work.

REFERENCES: Timber Sale Contract Provisions B4.225, C6.3, C6.312, C6.6, C6.601; FSM 2451, 2453.2, and 2533, SWCP 14.04; FSH 2409.15, Timber Sale Administration Handbook; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981.

PRACTICE: 14.13 - Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities

OBJECTIVE: To prevent erosion and sedimentation on disturbed areas.

EXPLANATION: Where soil is disturbed by Purchaser's operations on tractor roads, skid trails, landings, temporary road fills, and other logging sites, the purchaser shall provide adequate treatment to protect exposed soils. This may be accomplished by spreading slash or wood chips, mulching, establishing an adequate cover of grass or other vegetating acceptable to the Forest Service, or performing other agreed stabilization measures. This provision is to be used only for sales which contain special soil stabilization problems and are not expected to be revegetated by the normal methods prescribed under the standard Timber Sale Contract.

IMPLEMENTATION: The interdisciplinary team will identify areas needing special stabilization measures during the Timber Sale Planning Process. Treatment areas will be verified during sale layout and the estimate of work needed will be carried to the timber sale appraisal. Specific locations to be treated will be designated on the ground by the Forest Service. The Forest Service, upon request, shall provide advice as to soil preparation and the application of suitable seed mixtures, mulch, and fertilizer, and the timing of such work. It is the responsibility of the certified Sale Administrator to make sure that stabilization work is done correctly and in a timely manner.

REFERENCES: Timber Sale Contract Provisions B6.6, C6.6, and C6.601; SWCP 14.04; FSH 2409.15, Timber Sale Administration Handbook and FSH 2409.18, Sale Preparation handbook.

PRACTICE: 14.14 - Revegetation of Areas Disturbed by Harvest Activities

OBJECTIVES: To establish a vegetative cover on disturbed sites to prevent erosion and sedimentation.

EXPLANATION: Where soil has been severely disturbed by Purchaser's operations and establishment of vegetation is needed to minimize erosion, the Purchaser shall take appropriate measures normally used to establish an adequate cover of grass or other vegetation acceptable to Forest Service or take other agreed stabilization measures. This measure is applied in contracts where it is expected that disturbed soils in parts of the sale area will require vegetative cover for stabilization and the problems will not be mitigated by other contract provisions.

IMPLEMENTATION: An estimate of the need is included in the environmental analysis and timber sale appraisal. The Forest Service shall annually designate on the ground the disturbed soils, such as logging areas and temporary roads, that must be treated.

The Forest Service, upon request, shall provide advice as to soil preparation and the application of suitable seed mixtures, mulch, and fertilizer, and the timing of such work. It is the responsibility of the certified Sale Administrator to make sure that revegetation work is done correctly and in a timely manner.



REFERENCES: Timber Sale Contract Provisions B6.6, C6.6, and C6.601; SWCP 14.14; FSH 2409.15, Timber Sale Administration Handbook and FSH 2409.18, Sale Preparation Handbook.

PRACTICE: 14.15 - Erosion Control on Skid Trails

OBJECTIVE: To protect water quality by minimizing erosion and sedimentation derived from skid trails.

EXPLANATION: This practice employs preventive controls to reach the objective. The Timber Sale Contract requires the installation of erosion control measures on skid trails, tractor roads, and temporary roads. Normally, the work involves constructing cross ditches and water spreading ditches. Other methods such as backblading may be agreed to in lieu of cross drains. Grass seeding may also be required by a "C" provision which may be added to the Timber Sale Contract. Areas in need of erosion control measures are shown on the Sale Area Map and designated on the ground annually as logging and temporary access construction progresses.

IMPLEMENTATION: Location of all erosion control measures are designated and agreed to on the ground by the certified Sale Administrator. The Timber Sale Administration Handbook contains guidelines for spacing of cross drains, construction techniques, and cross drain heights. The Sale Administrator can use these guidelines on the ground to identify site specific preventive work to be required of the Purchaser. The Purchaser is obligated to complete and maintain erosion control work as specified in contract provisions.

REFERENCES: Timber Sale Contract Provisions B6.422, B6.6, B6.66, and C6.601; FSH 2409.15, Timber Sale Administration Handbook; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981.

PRACTICE: 14.16 - Meadow Protection During Timber Harvesting

OBJECTIVE: To avoid damage to the ground cover, soil, and water in meadows.

EXPLANATION: This is an administrative and preventive action. Unauthorized operation of vehicular or skidding equipment on meadows designated on Sale Area Maps and marked on the ground is prohibited. Vehicular or skidding equipment shall not be used on meadows except where roads, landings, and tractor roads are approved. Unless otherwise agreed, trees felled into meadows shall be removed by end-lining, and resulting logging slash shall also be removed.

IMPLEMENTATION: The concerns and constraints mentioned above are set forth in Timber Sale Contract requirements. Damage to meadows, stream courses, and Riparian Areas caused by unauthorized Purchaser's operations shall be repaired by the Purchaser in a timely and agreed manner to restore and prevent further damage.

This provision shall not apply when the damage is caused by fire suppression activities.

REFERENCES: Timber Sale Contract Provisions B6.61; E.O. 11990, Protection of Wetlands; SWCP 13.03, 14.03, 14.06, 14.08, and 14.17; FSH 2409.15, Timber Sale Administration Handbook; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 14.17 - Stream Channel Protection (Implementation and Enforcement)

**OBJECTIVES:** (1) To protect the natural flow of streams; (2) to provide unobstructed passage of stormflows; (3) to reduce sediment and other pollutants from entering streams; and (4) to restore the natural course of any stream as soon as practicable if the stream is diverted as a result of timber management activities.

**EXPLANATION:** This management practice employs administrative, preventive, and corrective measures to meet the objectives. The following points are fundamental to protecting stream channels:

- a. Location and motif of stream crossings must be agreed to prior to construction. This is done when locations of skid trails, tractor roads, and temporary roads are agreed on by the Forest Service and the Purchaser.
- b. Purchaser shall repair all damage to a streamcourse caused by Purchaser's operations, including damage to banks and channel, to an acceptable condition as agreed to by the certified Sale Administrator and Purchaser's representative.
- c. All project debris shall be removed from streamcourse and in an agreed manner that will cause the least disturbance.
- d. Wheeled or track laying equipment shall not operate within 50 feet slope distance of the apparent high water mark of streamcourses designated for protection in the Timber Sale Contract, except as agreed to by the certified Sale Administrator and the Purchaser.
- e. When ground skidding systems are employed, logs will be end-lined out of streamside and Riparian Areas, Equipment is permitted to enter streamside areas only at locations and times agreed to by the certified Sale Administrator and the Purchaser.
- f. Water bars and other erosion control structures will be located to prevent water and sediment from being channeled into streamcourses, and to dissipate concentrated flows.
- g. Material from temporary road and skid trail stream crossings is removed and streambanks restored to an acceptable condition, as agreed to by the certified Sale Administrator and Purchaser's representative.
- h. Logs or products shall be fully suspended above the ground when crossing streamcourses designated for protection in the Timber Sale Contract.

**IMPLEMENTATION:** The certified Sale Administrator works with the Purchaser's representative to insure that the Timber Sale Contract clauses covering the above items are carried out on the ground. Technical resource staffs can be consulted to help the Sale Administrator with decisions. In the event Purchaser causes debris to enter streamcourses in amounts which adversely affect the natural flow of the stream, water quality, or fishery resources, Purchaser shall remove such debris within 48 hours and in an agreed manner that will cause the least disturbance to streamcourses.

**REFERENCES:** FSM 2405.13 and 2452; FSH 2409.15, Timber Sale Administration Handbook; Timber Sale Contract Provisions B6.5, B6.6, C6.5 (R-1), C6.6, C6.51 (R-1), and

C6.53 (R-1); see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981.

**PRACTICE:** 14.18 - Erosion Control Structure Maintenance

**OBJECTIVE:** To insure that constructed erosion control structures are stabilized and working effectively.

**EXPLANATION:** Erosion control structures are only effective when they are in good repair and stable condition. Once the erosion control structures are constructed and seeded, there is a possibility that they may not become adequately vegetated or they may become damaged from subsequent harvest activities. It is necessary to provide follow-up inspection and structural maintenance in order to avoid these problems and insure adequate erosion control.

**IMPLEMENTATION:** During the period of the Timber Sale Contract, the Purchaser shall provide maintenance of soil erosion control structures constructed by the Purchaser until they become stabilized, but not for more than one year after their construction. After 1 year, erosion control work needed is accomplished through Watershed Improvement practices (SWCP 11.03).

The Forest Service may agree to perform such structure maintenance under B4.225 (Cooperative Deposits), if requested by the Purchaser, subject to agreement on rates. If the Purchaser fails to do seasonal maintenance work, the Forest Service may assume the responsibility and charge the Purchaser accordingly.

**REFERENCES:** Timber Sale Contract Provisions B6.6, B6.66, and B4.225; FSH 2409.15, Timber Sale Administration Handbook.

**PRACTICE:** 14.19 - Acceptance of Timber Sale Erosion Control Measures Before Sale Closure

**OBJECTIVE:** To assure the adequacy of required erosion control work on timber sales.

**EXPLANATION:** The effectiveness of soil erosion prevention and control measures is determined by the results found after sale areas have been exposed one or more years to the elements. Although a careful check is required before a timber sale is closed to assure that planned erosion work has been completed to the standard prescribed, the erosion prevention work done in previous years should be periodically inspected during the life of the timber sale. These inspections will help determine whether the planned work was adequate, if maintenance work is needed, the practicability of the various treatments used, and the necessity for modifying present standards or procedures.

**IMPLEMENTATION:** "Acceptable" erosion control means only minor deviation from established standards, provided no major or lasting impact is caused to soil and water resources. Certified Sale Administrators will not accept as complete erosion control, measures which fail to meet this criteria.

**REFERENCES:** FSM 2451, 2452, 2453, and 2456; Timber Sale Contract Provisions B6.6, B6.63, B6.64, B6.65, B6.66, and C6.6; SWCP 11.02; FSH 2409.15, Timber Sale Administration Handbook.

**PRACTICE:** 14.20 - Slash Treatment in Sensitive Areas

**OBJECTIVE:** To protect water quality by protecting sensitive tributary areas from degradation which would result from using mechanized equipment for slash disposal.

**EXPLANATION:** Special slash treatment may be prescribed in sensitive areas to facilitate slash disposal without use of mechanized equipment. Meadows, wetlands, Riparian Areas, and landslide areas are typically sensitive areas where equipment use is normally prohibited. Slash treatment methods are indicated for each harvest unit on the Slash Treatment Map and referenced in associated contract provisions.

**IMPLEMENTATION:** Sensitive areas needing protection are identified by the interdisciplinary team in the Timber Sale Planning Process. Results are documented during the environmental analysis and identified in the Timber Sale Contract and on the Slash Treatment Map. The certified Sale Administrator inspects the treatment for correct and satisfactory slash disposal accomplishment.

**REFERENCES:** Timber Sale Contract; SWCP 14.08, 14.16, and 14.17; FSH 2409.15, Timber Sale Administration Handbook and FSH 2409.18, Sale Preparation Handbook.

**PRACTICE:** 14.21 - Non-recurring "C" Provisions For Soil and Water Protection

**OBJECTIVE:** To exercise the option of inserting non-recurring (Special) "C" provisions into the Timber Sale Contract to protect soil and water resources, where standard "B" or "C" provisions do not apply or are inadequate to protect watershed values.

**EXPLANATION:** Non-recurring "C" provisions are sometimes needed to meet management objectives on a particular sale area. They require Regional Forester approval and may only be included in the sale for which approval was given. This practice can be used for a variety of special situations which may occur on any timber sale. There are no standard or set provisions that can be referenced, since each Special "C" provision is unique and specific to one sale.

**IMPLEMENTATION:** The need for non-recurring "C" provisions is identified during the Timber Sale Planning Process and environmental analysis by the interdisciplinary team. The Presale Forester prepares the non-recurring "C" provision and submits it through Line Officers to the Regional Forester for approval. The Regional Forester insures that the wording complements the Timber Sale Contract and returns it to the District with approval. The non-recurring "C" provision is applied by the certified Sale Administrator in the same manner as the standard contract provisions.

**REFERENCES:** FSM 2431.2, 2431.3, and 2431.4; FSH 2409.18, Sale Preparation Handbook.

**PRACTICE:** 14.22 - Modification of the Timber Sale Contract

**OBJECTIVE:** To modify the Timber Sale contract if new circumstances or conditions indicate that the timber sale will cause irreversible damage to soil, water, or watershed values.

**EXPLANATION:** Once timber slaes are sold, they are harvested as described in the Timber Sale Contract. However, it may be necessary to modify a timber sale contract because of new concerns about the effects of the sale on soil and water resources.

**IMPLEMENTATION:** If evidence indicates that unacceptable impacts would occur to soil and water resources if the sale was harvested as planned, the Forest Service Representative will request the Contracting Officer to gain Regional Forester advice and approval to proceed with a

resource environmental modification, mutual cancellation, or unilateral cancellation of the Timber Sale Contract. Once the decision to take action is approved by the Regional Forester, the appropriate Line Officer will assign an interdisciplinary team to make recommendations for implementation.

REFERENCES: NFMA, Section 6; Timber Sale Contract Provision B8.3; SWCP Handbook 10.40, Feedback Mechanism.

PRACTICE: 14.23 - Reforestation Requirement

OBJECTIVE: To promote prompt reforestation and to limit disturbance on areas with limited regeneration potential.

EXPLANATION: Forested lands will not be planned for timber harvest production objectives unless there is reasonable assurance that these sites can be adequately restocked within 5 years after final harvest, based on existing technology and knowledge. The 5-year time frame begins at different times for different silvicultural systems. Restocking is adequate when the cut area contains the minimum number, size, distribution, and species composition of regeneration as specified in the silvicultural prescription. Site preparation, species selection, and seedling protection are critical factors that need consideration for successful regeneration. The implementation of this practice affects soil and water resources by stabilizing solids, increasing ground cover, improving infiltration, and reducing surplus water yields.

In meeting overall resource objectives, some timber stands may be harvested to achieve multiple resource objectives other than timber production. Delaying immediate regeneration may be desirable for meeting the overall objectives.

IMPLEMENTATION: During the Timber Sale Planning Process, the interdisciplinary team assesses the resource objectives of the proposed areas and the capability to achieve reforestation within the prescribed period. The environmental analysis contains the interdisciplinary team determinations and recommendations. Past and present reforestation activities will be evaluated.

REFERENCES: FSH 2409.25b, Reforestation Handbook; NFMA (36 CFR 219.27 c(3)); FSM 2472; SWCP 11.02.

15 - ROADS AND TRAILS. Transportation systems are developed to serve the transportation needs of National Forest System lands and resource management programs. Transportation planning is a complex process that assures that roads and trails are planned, located, designed, constructed, and maintained to meet these long-term Forest management needs and objectives. General objectives are developed by legislation, policy, and directives and addressed in Forest Plans. Specific objectives are developed by an interdisciplinary team during the NEPA process in project planning.

Transportation planning is normally conducted on a Forest or area-wide basis with the objective of locating roads for individual timber sale areas and long range transportation needs. Alternative road corridors are mapped or flagged on the ground after consideration of management objectives and resource information. The interdisciplinary team reviews these corridors and makes recommendations for road design criteria, modifications of the corridor locations, use of existing roads, and upgrading inadequate roads.

The environmental effects, economic analysis, and recommendations from the interdisciplinary team are considered prior to selecting a preferred alternative by the Line Officer. The appropriate NEPA document resulting from the environmental analysis establishes design criteria which is used to develop design standards, erosion control measures, and the road operation and maintenance standards. Additional interdisciplinary team input may be required in the design phase to ensure meeting the management objectives.

During road construction, the Contract Officer and/or Engineering Representative shall be assigned to the project. These personnel assure that the project is constructed according to contract specifications and drawings. Interdisciplinary team members may be requested to review proposed design modifications during construction.

Subsequent to and upon road completion, periodic reviews of selected projects are made by interdisciplinary team members to evaluate the construction performance, the effectiveness of specific design features or treatments to control erosion, and the appropriateness of the level of maintenance. These reviews provide a feedback mechanism to improve future road construction and maintenance by modifying design or erosion control practices.

**PRACTICE: 15.01 - General Guidelines for Transportation Planning**

**OBJECTIVE:** To introduce soil and water resource considerations into Transportation Planning.

**EXPLANATION:** Transportation Planning shall be included as an integral part of the Forest Planning process. In some cases, a transportation facility may itself require an appropriate NEPA document. Transportation systems will be planned to achieve an optimum balance of minimum environmental effects at minimum, overall long-term cost, while meeting the land and resource management objectives.

Transportation Planning shall develop and evaluate alternative methods of providing needed transport services. Alternative methods may include alternative modes, routes, geometric features, materials standards, or some combination thereof. Evaluation shall include determining the social, environmental, and economic characteristics of each alternative. Selection of a recommended alternative shall be by the responsible Line Officer and the decision shall be documented. No implementing activities shall be undertaken prior to the approval by the responsible official.

**IMPLEMENTATION:** An interdisciplinary team during the NEPA process will evaluate watershed characteristics and estimate the response of soil and water resources to proposed transportation alternatives and activities. The NEPA process will identify mitigating measures needed to protect soil and water resources. The subsequent contract will include provisions to meet water quality, soil, and other resource protection requirements as directed by the environmental analysis.

**REFERENCES:** FSM 1950, 7700, and 7710; NFMA; NEPA; individual Forest Plans; SWCP 11.01, 11.02, 11.03, 11.04, 11.05, 11.06, 11.09, and 11.14; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981.

**PRACTICE: 15.02 - General Guidelines for the Location and Design of Roads and Trails**

**OBJECTIVE:** To locate and design roads and trails with minimal soil and water resource impact while considering all design criteria.

**EXPLANATION:** There are several considerations which must be incorporated into the location and design of roads and trails. These factors directly affect protection of water quality, soil, and other resource values. The following coordination instructions apply to all transportation activities:

- a. Area Transportation Analysis and project planning will be completed using an interdisciplinary process, and the appropriate NEPA document will be prepared and tiered to the Forest Plan. Area Transportation analysis is an extremely effective tool to reduce overall road mileages and, thus, minimize potential resource impacts.
- b. Location, design, and construction activities shall utilize appropriate technical resource staffs, when needed, to evaluate effects of transportation development and operations, and recommend mitigating measures to minimize adverse impacts.
- c. Roads and trails will be located and designed to facilitate completion of the transportation system, serve specific resource management needs, fit the terrain, and minimize damage to improvements and resources. Fragile, unstable, sensitive, or special areas should be avoided.
- d. Roads and trails should be designed based on traffic and safety requirements of anticipated use and to meet the overall transportation plan. The design shall incorporate features to prevent or minimize soil movement and sedimentation as well as undue disruption of water flow.
- e. Stream crossing structures shall be designed to provide the most efficient drainage facility consistent with resource protections, importance of the road, legal obligations, and total costs. The design may involve a hydrologic analysis to determine runoff rates and volumes, flood conditions, velocities, scour, open channel shapes, approach topography, materials-foundation condition, and fish passage, as required. An economic comparison of various flood frequencies versus structure sizes and types is also considered.
- f. Locate and design roads and trails to drain naturally by appropriate use of out-sloping or in-sloping with cross drainage and grade changes, where possible. Relief culverts and roadside ditches will be designed whenever reliance upon natural drainage would not protect the running surface, excavation, or embankment. Road and trail drainage should be channeled to effective buffer areas to maximize sediment deposition prior to entry into live water.

**IMPLEMENTATION:** during the environmental analysis, an interdisciplinary team will be used to insure that management needs, objectives, requirements, and controls are incorporated in the location and design of roads and trails. Mitigation measures needed to protect soil and water resources will be identified in the NEPA process. Contract provisions will be prepared that meet the soil and water resource protection requirements.

**REFERENCES:** FSM 7710 and 7720; NFMA; FSH 7709.56, Road Preconstruction Handbook; NEPA; SWCP 15.01; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981.

PRACTICE: 15.03 - Road and Trail Erosion Control Plan

**OBJECTIVE:** To prevent, limit, and mitigate erosion, sedimentation, and resulting water quality degradation prior to the initiation of construction and maintenance activities through effective contract administration during construction and timely implementation of erosion control practices.

**EXPLANATION:** Land disturbing activities usually result in at least short-term erosion. Poorly designed, located, constructed, and maintained roads and trails are usually responsible for the majority of stream sedimentation problems associated with forest management practices. By effectively planning for erosion control, sedimentation can be minimized.

Roads and trails require a variety of erosion control measures. Many erosion control practices will not only protect water quality but also maintain road prism integrity, reduce maintenance costs, and improve trafficability. The location of the road or trail with respect to streams, beneficial uses of that water, soil, and geologic information and other site factors govern the degree of stabilization required. Stabilization usually includes a combination of practices that promotes the reestablishment of vegetation on exposed slopes, provides physical protection to exposed surfaces, prevents and downslope movement of soil, or controls road drainage.

Since a newly constructed road is most susceptible to erosion from seasonal precipitation, the timing of erosion control practices is of primary concern. Those practices that can be accomplished concurrent with road counteractions shall be favored as a means of immediate protection of the water resource.

**IMPLEMENTATION:** Erosion control objectives and detailed mitigation measures are developed using an interdisciplinary approach during the environmental analysis. These measures and objectives shall be reflected in the contract specifications and provisions for the road or trail. When standard specifications do not provide the degree of mitigation required, special project specifications will be developed by the interdisciplinary team.

Prior to the start of construction, the Purchaser shall submit a schedule for proposed erosion control work as required in the Standard Specifications. The schedule shall include all erosion control items identified in the specifications. The schedule shall consider erosion control work necessary for all phases of the project. The Purchaser's construction schedule and plan of operation will be reviewed in conjunction with the erosion control plan to insure their compatibility before any schedules are approved. No work will be permitted on the project until all schedules have been approved by the Contracting Officer.

The Contracting Officer or Engineering Representative shall ensure that erosion control measures are implemented according to the approved schedule and are completed in an acceptable fashion. Field reviews and on-site inspection by the Line Officer and/or Forest Engineer will identify any additional erosion control measures required to protect the streams that were not recognized during planning or design. Necessary correction measures shall be implemented immediately through normal administrative channels.

The following items may be considered as erosion control measures when constructed in a timely manner. To maximize effectiveness, erosion control measures must be in place and functional prior to seasonal precipitation or runoff.



- a. Measures to reestablish vegetation on exposed soils. This is usually accomplished by seeding suitable grass and legume species in conjunction with mulching and fertilization. In some situations, treatments may include tree seedling planting or sprigging of other woody species.
- b. measures which physically protect the soil surface from detachment or modify the topography to minimize erosion. These treatments may include the use of dust oil or gravel on the road travelway and ditches and the use of mulches, riprap, erosion mats, and terracing on cuts, fills, and ditches. Temporary waterbars in areas of uncompleted roads and trails can be effectively utilized to reduce sedimentation.
- c. Measures which physically inhibit the downslope movement of sediments to streams. These may include the use of slash filter windrows on or below the fill slopes, baled straw in ditches or below fillslopes, catch basins at culvert inlets, and sediment basin slash filter windrows may be utilized in live water drainages where fish passage is not required and where peakflows are low.
- d. Measures that reduce the amount of soil disturbance in or near streams. These measures may include dewatering culvert installation or other construction sites, and immediate placement of permanent culverts during road pioneering. Temporary pipes should not be allowed unless positive control of sedimentation can be accomplished during installation, use, and removal.
- e. Measures that control the concentration and flow of surface and subsurface water. These may include insloping, outsloping, ditches, cross drains, under drains, trenches, and so forth.

REFERENCES: FSM 7721, 7722, and 7723; Timber Sale Contract Provisions B6.31, B6.5, B6.6, and C6.3; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion prevention and Control on Timber Sale Areas, May 1981; Cook, M.J. and J.G. King. 1983. Construction Cost and Erosion Control Effectiveness of Filter Windrows on Fill Slopes. USDA Forest Service Research Note, INT-335; SWCP Handbook 10.40 Feedback mechanism; FSH 7709.56b, Drainage Structures Handbook.

PRACTICE: 15.04 - Timing of Construction Activities

OBJECTIVE: To minimize erosion by conducting operations during minimal runoff periods.

EXPLANATION: Erosion and sedimentation are directly related to runoff. Scheduling operations during periods when the probabilities for rain and runoff are low is an essential element of effective erosion control. Purchasers shall schedule and conduct operations to prevent erosion and sedimentation. Equipment shall not be operated when ground conditions are such that excessive impacts will result. Such conditions are identified by the Contracting Officer or Engineering Representative with assistance from technical resource staffs as needed. Temporary erosion control measures may be required to prevent, control, and mitigate erosion and sedimentation.

In addition, it is important to keep permanent erosion control work as current as practicable with ongoing operations. Construction of drainage facilities and performance of other contract work which will contribute to the control of erosion and sedimentation shall be carried out concurrent with earthwork operations or as soon thereafter as practicable. Limitation of the amount of area

being graded at a site at any one time, and minimization of the time that an area is laid bare should be a consideration in contract preparation. Erosion control work must be kept current when road construction occurs outside of the normal operating season.

**IMPLEMENTATION:** Detailed erosion control measures are developed by an interdisciplinary team during the environmental analysis and are incorporated into the contract specifications. Compliance with plans, specifications, and the operating plan is assured by the Contracting Officer and/or Engineering Representative.

**REFERENCES:** FAR 52.236-15; Timber Sale Contract Provisions C6.3, C6.36, and B6.31; SWCP 15.03; see references in "Best Management Practice" Definition (05--2 and 3).

**PRACTICES:** 15.05 - Slope Stabilization and Prevention of Mass Failures

**OBJECTIVES:** To reduce sedimentation by minimizing the chances for road-related mass failures, including landslides and embankment slumps.

**EXPLANATION:** Road construction in mountainous terrain requires cutting and loading natural slopes which may lead to landslides and/or embankment failures depending on the soil strength, geology, vegetation, aspect, and groundwater regime. Landslides and embankment failures are undesirable because they interrupt traffic, are costly to repair, visually unacceptable, and generate large quantities of erosion and sedimentation.

Roadways may drastically change the subsurface drainage characteristics of a slope. Since the angle and height of cut and fill slopes increase the risk of instability, it is often necessary to provide subsurface drainage to avoid moisture saturation and subsequent slope failure. Where it is necessary, horizontal drains, drainage trenches, or drainage blankets may be used to lower the subsurface water levels and to prevent groundwater from entering embankments.

In areas with high landslide potential, the composition and characteristics of embankments may be controlled since they are essentially engineered structures. Care must be taken to prevent the incorporation of construction slash or other organic material and the embankment material should be placed by one of the following methods.

- a. Layer placement.
- b. Controlled compaction.
- c. Controlled compaction using density controlled strips.
- d. Compaction controlled with a special project specification.

**IMPLEMENTATION:** In areas with intrinsic slope stability problems, appropriate technical resource staffs must be involved in an interdisciplinary approach to route location. Sufficient subsurface investigation and laboratory testing must be performed to general design parameters and mitigating features which will meet the constraints and requirements developed through the NEPA process.

In contracted projects, compliance with environmental analysis requirements and controls which have been provided for in the specifications is assured by enforcement of the Timber Sale Contract Provisions by the Contracting Officer and/or Engineering Representative.

REFERENCES: FSM 7706.11, 7706.12, 7710, and 7720; Standard Specifications 203, 212, 605, 613, 619, 630, and 631; Timber Sale Contract Provisions B6.31, B6.62, C5.2, C5.4, and C6.36; FSH 7709.11, Transportation Engineering Handbook and FSH 7709.56b, Drainage Structures Handbook; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion prevention and Control on Timber Sale Areas, May 1981.

PRACTICE: 15.06 - Mitigation of Surface Erosion and Stabilization of Slopes

OBJECTIVE: To minimize soil erosion from road cutslopes, fillslopes, and travelway.

EXPLANATION: Road construction exposes fresh, loose soil to the erosive force of wind, water, and traffic. Surface erosion from roads is greatest during the first year following construction. It is desirable to minimize erosion due to the adverse impacts on water quality, vehicle maintenance, road maintenance, and safety. Erosion can occur on cutslopes, fillslopes, and/or travelway. Each of the three surfaces has unique erosion consideration which are outlined below:

<u>Surface</u>	<u>General Characteristics</u>	<u>Stabilization-Mitigation Measures</u>
Cutslope	Steeper, undisturbed, and more sterile soil	Vegetative and mechanical stabilization
Fillslope	Flatter, loose, and more fertile soil	Vegetative and mechanical stabilization
Travelway	Flattest, compact (due to traffic)	Surface Stabilization

Vegetative measures include seeding herbaceous species (grass, legumes, or browse species) or the planting of brush or trees.

Fertilization, mulching, watering, and/or erosion netting and fabrics may be required to insure success.

Mechanical measures include construction of slash windrows, straw bale dams, erosion netting and fabrics, terraces, or benching, riprapping, tackifiers, and gunnite.

Surface stabilization includes watering, dust oiling, dust pallatives, aggregate layer, bituminous surface treatment, or asphalt paving depending on traffic, soils, and climatic factors.

An integrated system of collection control, and dispersion of concentrated surface water is very important in order to prevent erosion on fillslopes, travelways, and natural slopes below cross drains and culverts.

IMPLEMENTATION: During the NEPA process, detailed mitigation measures and slope stabilization techniques are incorporated into the design package by the interdisciplinary team. Compliance with environmental analysis controls and requirements is obtained by the Contracting Officer and/or Engineering Representative through the Standard Specifications and/or Timber Sale Contract Provisions.

REFERENCES: FSM 7706.11, 7706.12, 7706.13, and 7720; Standard Specifications 50.4, 203, 204, 206A, 210, 212, 412, 619, 625, 626, 629, and 630; Timber Sale Contract Provisions B6.31, B6.6, B6.62, B6.65, B6.66, C5.2, C5.23, C5.4, C5.441, C5.46, R-1 C6.36, C6.52, C6.6, C6.601, and C6.622; SWCP 15.03 and 15.04; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion prevention and Control on Timber Sale Areas, May 1981.

PRACTICE: 15.07 - Control of Permanent Road Drainage

OBJECTIVE: To minimize the erosive effects of concentrated water and the degradation of water quality by proper design and construction of road drainage systems and drainage control structures.

EXPLANATION: Degradation of water quality by sediment and the erosive effects of surface runoff can be minimized by stabilizing the road prism and adjacent disturbed areas from erosion. Velocities in the road drainage system can be dissipated before entry into the natural system by design and construction of control structures.

A number of measures can be used alone or in combination to control the detrimental effects of road drainage. Methods used to control water and reduce erosion may include: properly spaced culverts, cross drains, water bars, rolling dips, energy dissipaters, aprons, gabions, and armoring of ditches and drain inlets and outlets. Dispersal of runoff can also be accomplished by rolling the grade, insloping, outsloping crowning, contour trenching, installation of water spreading ditches, and so forth.

IMPLEMENTATION: Project location, design criteria, drainage control features, and detailed mitigation measures are determined during the NEPA process by an interdisciplinary approach. Compliance with plans, specifications, and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: SWCP 15.02, 15.03, 15.06; Timber Sale Contract Provisions B6.6, B6.66, C6.3, C6.6, and C6.601; FSM 7721, 7723, 7706.11, and 7706.12; FSH 7709.56b, Drainage Structures Handbook; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion prevention and Control on Timber Sale Areas, May 1981.

PRACTICE: 15.08 - Pioneer Road Construction

OBJECTIVE: To minimize sediment production and mass wasting associated with pioneer road construction.

EXPLANATION: Pioneer roads are built to allow equipment access for construction of planned roadways. Pioneering is usually done within the corridor of the planned road. To meet the objective of minimizing sediment, the following constraints should be followed:

- a. Construction of pioneer roads shall be confined to the roadway construction limits unless otherwise approved by the Contracting Officer.
- b. Pioneering shall be conducted so as to prevent undercutting of the designated final cut slope, prevent avoidable deposition of materials outside the designated roadway limits, and accommodate drainage with temporary culverts or log crossings unless approved otherwise.

- c. Erosion control work will be completed concurrent with construction activity or prior to the wet season.
- d. Live streams crossed by pioneer roads will be dewatered by diversion devices.

IMPLEMENTATION: The Contracting Officer or Engineering Representative are responsible for enforcing contract specifications, drawings, and plans. The Purchaser is responsible for submitting for approval an operating plan that includes erosion control measures.

REFERENCES: SWCP 15.02, 15.03, 15.04, 15.05, and 15.06; Standard Specification 201, 203; FSM 7721; Timber Sale Contract Provisions B6.6, B6.65, C6.3; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 15.09 - Timely Erosion Control Measures on Incomplete Roads and Streamcrossing Projects

OBJECTIVE: To minimize erosion of and sedimentation from disturbed ground on incomplete projects.

EXPLANATION: The best drainage design and erosion control measure can be useless if projects are incomplete at the end of the normal operating season. Affected areas can include roads, fills, tractor trails, skid trails, landings, streamcrossings, bridge excavations, and firelines. Preventive measures include:

- a. The removal of temporary culverts, culvert plugs, diversion dams, or elevated streamcrossing causeways.
- b. The installation of temporary culverts, side drains, flumes, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, debris racks, or other facilities needed to control erosion.
- c. The removal of debris, obstructions, and spoil material from channels and floodplains.
- d. Grass seeding, planting deep rooted vegetation, and/or mulching.

IMPLEMENTATION: Protective measures must be applied to all areas of disturbed, erosion-prone, unprotected ground that is not to be further disturbed in the present year. When conditions permit operations outside the Normal Operating Season, erosion control measures must be kept current with ground disturbance, to the extent that the affected area can be rapidly closed, if the weather conditions deteriorate. Areas must not be abandoned for the winter with remedial measures incomplete.

Project location and mitigative measures are developed in the NEPA process using an interdisciplinary approach. Compliance with environmental analysis controls and requirements, contract specifications, and operating plans are assured by the Contracting Officer or Engineering Representative.

REFERENCES: FSM 7721; Standard Specification 206; Timber Sale Contract Provisions B6.31, B6.6, C6.6; FAR 52.213-3, 52.236-15, and 4G-52.235-107; SWCP 15.03 and 15.04; see reference in "Best Management Practice" Definition (05--2 and 3).

**PRACTICE: 15.10 - Control of Road Construction Excavation and Sidecast Material**

**OBJECTIVE:** To reduce sedimentation from unconsolidated excavated and sidecast material caused by road construction, reconstruction, or maintenance.

**EXPLANATION:** Unconsolidated material from road construction is frequently exposed on cut and fillslopes, can be difficult to stabilize, and represents a major sediment source. The area of exposed material is often reduced when the cut and fillslopes and roadbed are constructed to the lines, grades, and dimensions shown on the drawings or designated on the ground. The Contracting Officer and/or Engineering Representative insures that construction is within tolerances, particularly on sections of high erosion or stability hazards. In some cases layer placement and/or benching may be necessary for stabilization and to obtain the proper dimensions and fill slope ratios. End hauling and retaining structure may be necessary to prevent thin layers of consolidated material from being sidecast on steep slopes where compaction is impractical. Prior to commencing construction, reconstruction, or maintenance activities, waste areas should be located where excess material can be deposited and stabilized. If waste areas are located on steep slopes, sidecast materials should be consolidated and stabilized. Disposal of slide debris should be in areas where it can be stabilized. The purchaser may be required to remove excess material not placed according to the contract and/or restore damaged areas.

Normal erosion control such as seeding should be supplemented with special mitigation measures such as jute netting, erosion cloth, mulching, slash windrows, sediment ponds, hay bale dams, and rock gabions, when such measures are determined necessary for local conditions.

**IMPLEMENTATION:** Project location, selected disposal areas, and mitigative measures are developed through the NEPA process, using an interdisciplinary approach. Forest Service supervisors are responsible for insuring that In-Service projects meet design standards and project requirements. For contracted projects, compliance with specifications and operating plans is assured by the Contracting Officer and/or Engineering Representative.

**REFERENCES:** FSM 7720.3, 7706.11, and 7721; Standard Specification 203; SWCP 15.03, 15.05, 15.06, and 15.09; Timber Sale Contract Provisions C6.221 and C5.4; see reference in "Best Management Practice" Definition (05--2 and 3).

**PRACTICE: 15.11 - Servicing and Refueling of Equipment**

**OBJECTIVE:** To prevent contamination of waters from accidental spills of fuels, lubricants, bitumens, raw sewage, wash water, and other harmful materials.

**EXPLANATION:** During servicing or refueling, pollutants from logging or road construction equipment may enter a watercourse. This threat is minimized by selecting service and refueling areas well away from wet areas and surface watercourses and by using berms around such sites to contain spills.

**IMPLEMENTATION:** The Contracting Officer, Engineering Representative, or certified Sale Administrator will designate the location, size and allowable uses of service and refueling areas. They will also be aware of actions to be taken in case of a hazardous spill, as outlined in the Forest Hazardous Substance Spill Contingency Plan (SWCP 11.07).

REFERENCES: SWCP 11.07; Timber Sale Contract Provisions B6.34, C6.341, and C6.34; Standard Specifications 204.42; FSH 2409.15, Timber Sale Administration Handbook; see reference in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 15.12 - Control of Construction in Riparian Areas

OBJECTIVE: To minimize the adverse effects on Riparian Areas from roads and trails.

EXPLANATION: Except at designated stream crossings, road and trail construction will avoid placing fill materials or structures in Riparian Areas that will directly affect the ecological values of the stream. Occasionally exceptions may occur. These instances should be identified by the interdisciplinary team in the NEPA process and the final location designed to create the minimum impact possible. Factors such as stream class, channel stability, sideslope steepness, slope stability, resources dependent on these areas and standards, guidelines, and direction from Forest Plans are considered in determining the management of activities and width of Riparian Areas. Mitigation measures should be used to the optimum to insure minimum impact.

IMPLEMENTATION: Riparian Area requirements are identified during the environmental analysis by the interdisciplinary team. The road or trail project is designed to include site specific recommendations for the prevention of sedimentation and other stream damage from road/trail activities. As appropriated, monitoring and evaluation will be identified in the NEPA documentation. Forest Service supervisors are responsible for insuring that In-Service projects meet design standards and project requirements. On contracted projects, compliance with project requirements, contract specifications and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: SWCP 11.02, 14.03, and 14.06 FSM 7706.11 7706.12, 7706.14 and 7710; Timber Sale Contract Provisions B6.5, B6.61, C6.51, and C6.52; see reference in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 15.13 - Controlling In-Channel Excavation

OBJECTIVE: To minimize stream channel disturbances and related sediment production.

EXPLANATION: During the construction of roads and the installation of stream crossing structures, it may be necessary for construction equipment to cross, operate in, or operate near streamcourses. However, this will be allowed only at crossings designated by the Forest Service or as necessary in the construction or removal of culverts and bridges. Close coordination is needed with the Purchaser to minimize damage to the stream and aquatic resources.

Also, excavation during the installation of streamside structures should be accomplished in the following manner in order to protect water quality. Unless otherwise approved, no excavation shall be made outside of caissons, cribs, cofferdams, or sheet piling, and the natural stream bed adjacent to the structure shall not be disturbed without approval of the Engineering Representative or Contracting Officer. If any excavation or dredging is made at the site of the structure before caissons, cribs, or cofferdams are sunk in place, all such excavations will be restored to the original ground surface or the stream bed will be protected with suitable stable material. Material deposited within the stream area from foundation or other excavation shall not be discharged directly into live streams but shall be pumped to settling areas shown on the drawings or approved by the Engineering Representative or Contracting Officer. If the channel is damaged during construction, it should be restored as nearly as possible to its original

configuration without causing additional damage to the channel. Excavations for stream crossings should be started early enough in the summer so that the installation is complete before winter.

**IMPLEMENTATION:** Project location and mitigation measures are developed by the interdisciplinary team during the NEPA process and are inserted into the contract. Compliance with the management requirements, contract specifications, and operating plans is assured by the Contracting Officer or Engineering Representative.

**REFERENCES:** FAR 52.213-3, 52.236-15, and 4G-52.236-107; FSM 7721 and 2502.1; Standard Specifications 206; Timber Sale Contract Provisions C6.36, C6.52, and B6.5; EO 11988, Flood Plain Management; SWCP 11.04, 11.05, 14.03, 14.06, and 15.12; see reference in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981

**PRACTICE:** 15.14 - Diversion of Flows Around Construction Sites

**OBJECTIVE:** To minimize downstream sedimentation by insuring that all stream diversions are carefully planned.

**EXPLANATION:** Flow must sometimes be guided or piped around project sites. Typical examples are bridge and dam construction. Flow in streamcourses will be diverted if the Forest Service deems it necessary for the Purchaser to do the job. Such a diverted flow shall be restored to the natural streamcourse as soon as practicable and, in any event, prior to the major storm season or fish migration season. Stream channels impacted by construction activity will be restored to their natural grade, conditions, and alignment as soon as possible.

**IMPLEMENTATION:** The interdisciplinary team during the environmental analysis will identify where diversions are required and the project design will include mitigative measures to protect fishery values and other downstream uses. The NEPA process may require project review by other Federal, State, and/or local agencies and private parties, to insure that all factors are considered. For In-Service projects, Forest Service supervisors are responsible for implementing design standards and management requirements. On contracted projects, compliance with contract specifications and operating plans is assured by the Contracting Officer or Engineering Representative.

**REFERENCES:** Timber Sale Contract Provisions B6.5, C6.3, C6.51, C6.52, and C6.6; FSM 2505.1 and 7721; FAR 52.213-3, 52.236-15, and 4G-52.236-107; FSH 7709.56b, Drainage Structures Handbook; EO 11988, Flood plain Management; SWCP 11.04, 11.05, 14.03, 14.06, 15.12, and 15.13; see reference in "Best Management Practice" Definition (05--2 and 3).

**PRACTICE:** 15.15 - Streamcrossings on Temporary Roads

**OBJECTIVE:** To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.

**EXPLANATION:** Culverts, temporary bridges, low water crossings, or fords will be required on temporary roads at all locations where it is necessary to cross streamcourses. Such facilities shall be designed and installed to provide unobstructed stream flow and fish passage, and to minimize damage to streamcourses.



The number of crossings shall be kept to the minimum needed for access. Channel crossings should generally be as perpendicular to streamcourses as possible. Streambank excavation shall be kept to the minimum needed for use of the crossings.

Crossing facilities shall be removed when the facility has served its purpose and is no longer needed. Fills associated with these facilities shall also be removed.

IMPLEMENTATION: Project location and protective measures are developed by the interdisciplinary team during the NEPA process. Those developed by the Purchaser will be reviewed and approved by the certified Sale Administrator or Contracting Officer. Forest Service supervisors are responsible for insuring that In-Service projects meet management objectives and requirements. For contracted projects, compliance with specifications and operating plans is assured by the Contracting Officer, certified Sale Administrator, or Engineering Representative.

REFERENCES: Timber Sale Contract Provisions B6.5, B6.62, B6.65, C6.3, C6.51, C6.52, C6.6, and C6.753; FSH 2409.15, Timber Sale Administration Handbook, FSM 2505.1 and 7721; FAR 4G-52.236-107; SWCP 11.04, 11.05, 14.03 14.06, 14.17, 15.12, 15.13, and 15.14; see reference in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide-Erosion Prevention and Control on Timber Sale Areas, May 1981.

PRACTICE: 15.16 - Bridge and Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)

OBJECTIVE: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

EXPLANATION: Excavation in or near streamcourse is a common requirement for the installation of bridges, culverts, and other streamside structures such as weirs, check dams, riprapping, or fish passage structures. Surplus material should not obstruct the streamcourse including the floodplain nor the efficiency of the associated structure. Preventive measures include:

- a. Diverting stream flow around project sites during construction in order to minimize erosion and downstream sedimentation.
- b. Easily erodible material shall not be deposited into live streams.
- c. Any material stockpiled on floodplains shall be removed before rising waters reach the stockpiled material.
- d. During excavation in or near the streamcourse, it may be necessary to use suitable coffer dams, caissons, cribs or sheet piling. This will usually be the case where groundwater is contributing a significant amount of water to the immediate excavation area. If any of the aforementioned devices are used, they will be practically watertight and no excavation will be immediately outside of them. If water from subsurface strata is not significant, pumping may be used, provided the sediment from the pumped water can be disposed of where it will not re-enter the stream during high flows.
- e. Water pumped from foundation excavation shall not be discharged directly into live streams, but shall be pumped into settling ponds.

- f. When needed, bypass roads should be located to have the minimal disturbance on the streamcourse.
- g. The construction activity in or adjacent to the stream will be limited to specific times to protect beneficial water uses (such as fisheries).

**IMPLEMENTATION:** Project location and detailed mitigative measures are developed in the environmental analysis and are detailed in the appropriate NEPA document using an interdisciplinary team approach. Forest Service supervisors are responsible for insuring that In-Service projects meet the design standards. For contracted projects, compliance with contract specifications and operating plans is assured by the Contracting Officer or Engineering Representative.

**REFERENCES:** FAR 52.213-3, 52.236-15, and 4G-52.235-107; Standard Specifications 206 and 206A; Timber Sale Contract Provision C6.5; FSM 2505.1; see reference in "Best Management Practice" Definition (05--2 and 3).

**PRACTICE:** 15.17 - Regulation of Borrow Pits, Gravel Sources and Quarries

**OBJECTIVES:** To minimize sediment production from borrow pits, gravel sources, and quarries, and limit channel disturbance in those gravel sources suitable for development in floodplains.

**EXPLANATION:** Borrow pits, gravel sources, and quarries are often susceptible to erosion due to steep side slopes, lack of vegetation, and/or their proximity to water courses. Whenever possible, the top soil should be removed and stockpiled for use as surface dressing during the reclamation phases, prior to excavation of the site.

Drainage design for the excavation should consider temporary erosion control measures during the life of the material source and permanent drainage control measures after the site has been rehabilitated. When excavation of the site has been completed on all or part of the area, and the site will not be used again, the sides will be sloped, graded, or scaled and the general pit are smoothed and stabilized. Oversized material, if planned for future use as riprap or derrick rock, should be stockpiled. If not, it should be scattered or buried. Finer material, if available, should be spread over the bottom of the pit prior to spreading stockpiled or imported topsoil. Seeding, mulching, and/or planting should be carried out. If the site will be used again, the above requirements will be limited to those essential to resource protection between uses. Access roads to the site should also have temporary or permanent drainage design for erosion control depending on the life of the pit or the roads should be ripped, drained, blocked to traffic, and seeded, mulched, and/or planted unless other uses are planned.

Borrow pits and gravel sources located in floodplains require special attention. Material deposited in floodplains or along channel sections during storm runoff often provide excellent and inexpensive sand and gravel. Because of easy access, these deposits are often in demand. With careful planning and design, these deposits can be removed with minimal impact on water resources. Under some circumstances, sand and/or gravel removal may alter stream flow characteristics and consequently affect stream channel stability and create a new sediment source. Excavation of these deposits within stream channels should be limited to those above the waterline which is normal for the period of the excavation. If the borrow area is subject to periodic flooding, leveling, shaping, or other special drainage features shall be provided.

Excavation in flood plains should not take place below the water table unless sediment basins are built to contain or catch the resulting sediment. Sediment basins should not be subject to washouts. If excess sediment accumulates in basins, it should be excavated to clean the basin and the sediment removed to an approved site.

Wash water or waste from concrete batching or aggregate operations shall not be allowed to enter streams prior to treatment by filtration, flocculations, settling and/or other means. The potential pollution of adjacent water resources by blasting agent in quarry operations shall be addressed in the pit operation plan.

IMPLEMENTATION: Project feasibility, location, suitability, and the limits for disturbance and sediment production will be identified through the NEPA process using an interdisciplinary approach. Detailed mitigative measures are developed by the design engineer using criteria from the environmental analysis and through consultation with technical resource staffs when needed. Development of borrow pits or gravel sources in the floodplain will be coordinated with State and local agencies.

Special-use permits issued for borrow pits, gravel sources, and quarries will include the above requirements and District Rangers or their representatives are responsible for insuring compliance. Forest Service supervisors are responsible for implementing In-Service projects to design standards. For contracted projects, compliance with management requirements, specifications, and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: FSM 2511, 2502.1, 7706.11, 7706.12, 7721; FSH 7709.11, Transportation Engineering Handbook, and FSH 7709.56, Road Preconstruction Handbook; FAR 52.236-09; Standard Specifications 203, 210, 611, 624, 625, 626, and 629; Timber Sale Contract Provision B6.31, B6.6, B6.62, B6.65, and B6.66, C5.2, C5.23, C5.4, C6.36, C6.52, C6.6, C6.601, C6.622; Water Pollution Control Act, 33 USC 466; NEPA; Montana Water Quality Act and Hardrock Act; Idaho Dredge and Placer Mining Act, Title 47, Ch. 13; SWCP 11.04, 11.05, 15.03; see reference in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 15.18 - Disposal of Right-of-Way and Roadside Debris

OBJECTIVE: To insure that debris generated during road construction is kept out of streams and to prevent slash and debris from subsequently obstructing channels.

EXPLANATION: As a preventive measure, counteractions debris and other newly generated slash developed along roads near streams shall be disposed of by the following means as applicable:

- a. On-Site.
  - (1) Windrowing (SWCP 15.03).
  - (2) Scattering
  - (3) Burying
  - (4) Chipping
  - (5) Disposal in Cutting Units

(6) Piling and Burning

- b. Removal to agreed upon locations.
- c. A combination of the above.
- d. Large limbs and cull logs may be bucked into manageable lengths and piled alongside the road for fuelwood.

IMPLEMENTATION: Criteria for the disposal of Right-of-Way and roadside debris are established in the environmental analysis by an interdisciplinary team. Project location and detailed mitigative measures are also developed. Forest Service supervisors are responsible for insuring that In-Service projects meet design standards. For contracted projects, compliance with plans, specifications, and operating plans is assured by the Contracting Officer, Engineering Representative, or certified Sale Administrator.

REFERENCES: Timber Sale Contract; SWCP 13.05, 14.20, and 15.03; see reference in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 15.19 - Streambank Protection

OBJECTIVE: To minimize sediment production from streambanks and structural abutments in natural waterways.

EXPLANATION: The stabilization of stream embankments disturbed by the construction of a water crossing or a roadway fill parallel to a streamcourse, is necessary to prevent erosion of the material during natural stream flow. To reduce sediment and channel bank degradation, it is necessary to incorporate "armoring" in the design of a structure to allow the water course to stabilize after construction. Riprap, gabion structures, and other measures are commonly used to armor stream banks and drainage ways from the erosive forces of flowing water. These measures must be sized and installed in such a way that they effectively resist erosive water velocities. Stone used for riprap should be free from weakly structured rock, soil, organic material and materials of insufficient size, all of which are not resistant to stream flow and would only serve as sediment sources. Outlets for drainage facilities in erodible soils commonly require riprapping for energy dissipation.'

IMPLEMENTATION: Project location and detailed mitigative measures are developed through the NEPA process to meet the objectives and requirements of the management. Forest Service supervisors are responsible for implementing In-Service projects to design standards and management requirements. For contracted projects, compliance with contract specifications and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: SWCP 15.03; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide-Erosion Prevention and Control on Timber Sale Areas, May 1981.

PRACTICE: 15.20 - Water Source Development Consistent With Water Quality Protection

OBJECTIVE: To supply water for road construction and maintenance and fire protection while maintaining water quality.

**EXPLANATION:** Water source development is normally needed to supply water for road construction, dust control, mixing surface, compaction, planting and for fire control requirements of the timber Purchaser. Water source development should aim toward the construction of durable, long term water sources rather than the construction of hasty, expedient developments. Permanently designed sources, such as tanks, will result in the lowest, long term impact to the affected streams.

Other considerations in the development of water sources should be:

- a. Downstream flow should not be reduced so as to detrimentally affect aquatic resources, fish passage, or other uses.
- b. Temporary cofferdams should be constructed of sandbags containing sand or clean gravel, or of other materials and means which will not induce sediment in the stream.
- c. Overflow should go directly back into the stream.
- d. All temporary facilities for gathering water will be removed prior to causing any resource damage.

**IMPLEMENTATION:** Certified Sale Administrators and Engineering Representatives in conjunction with technical resource staffs should evaluate streams in which water developments may be constructed. Project location and detailed mitigative measures are developed by the interdisciplinary approach during the environmental analysis. Forest Service supervisors are responsible for insuring that In-Service projects meet design standards and management requirements. For contracted projects, compliance with contract specifications and the operating plan is assured by the Contracting Officer and/or engineering Representative.

Any damage to resources caused by Purchaser's operations or fire suppression activities shall be retired by purchaser or fire suppression crews in a timely and agreed manner to the extent practical to restore and prevent further resource damage.

**REFERENCES:** Standard Specification 207; Timber Sale Contract Provisions; SWCP 14.03; Timber Sale Administration Handbook (FSH 2409.150; see references in "Best Management Practice" Definition (05--2 and 3).

**PRACTICE:** 15.21 - Maintenance of Roads

**OBJECTIVE:** To maintain all roads in a manner which provides for soil and water resource protection by minimizing rutting, failures, sidecasting, and blockage of drainage facilities.

**EXPLANATION:** Roads normally deteriorate because of use and weather impacts. This deterioration can be minimized through proper and timely maintenance and/or restriction of use (SWCP 11.09). All system roads will be maintained to at least the following level: Provide the basic custodial care required to protect the road investment and to insure that damage to adjacent land and resources is held to minimum. This level of maintenance often requires an annual inspection to determine what work, if any, is needed to keep drainage functional and the road stable. This level is the normal prescription for roads that are closed to traffic. As a minimum measure, maintenance must protect drainage facilities and runoff patterns. Higher levels of maintenance may be chosen to reflect greater use or resource administrative needs. Additional

maintenance measures could include resurfacing, outsloping, clearing debris from dips and cross drains, armoring of ditches, spot rocking, and drainage improvement.

Maintenance needs will be reflected in an annual road maintenance plan developed to include all roads under Forest Service control. Individual maintenance plans will be developed annually for each timber sale and for each cost share area outlining performance standards, responsibilities, and timing.

For maintenance of roads on active timber sales, the Forest Service and the Purchaser shall annually agree at the beginning of the operating season on an Annual Road Maintenance Plan outlining responsibilities and timing. If the road is subjected to commercial use, the Forest Service may collect deposits to facilitate road maintenance and to equitably assess maintenance cost of each user.

In addition to timely performance of regular maintenance, each Forest should have an emergency action plan which identifies procedures to be used during periods of high runoff to protect facilities and reduce resource damage.

**IMPLEMENTATION:** The work is controlled through the Forest Engineer who is responsible for the development of the annual road maintenance plan based on condition surveys. Maintenance levels are established for each road and maintenance performed in accordance with standards. On timber sales, maintenance is a Purchaser responsibility and compliance with standards is assured by the Contracting Officer, Engineering Representative, or certified Sale Administrator. On system roads outside of active timber sales, road maintenance is insured by the Engineering Representative or Contracting Officer.

**REFERENCES:** FSM 7730.2, 7732, and 7735; FSH 2409.15, Timber Sale Administration Handbook and FSH 7709.15, Transportation System Maintenance Handbook; Timber Sale Contract provision C5.4; SWP 11.09; see references in "Best management Practice" Definition (05--2 and 3).

**PRACTICE:** 15.22 - Road Surface Treatment to Prevent Loss of Materials

**OBJECTIVE:** To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production.

**EXPLANATION:** Unconsolidated road surface material is susceptible to erosion during precipitation events. Likewise, dust derived from road use may settle onto adjacent water bodies. On timber sale roads, the Purchaser shall undertake measures to prevent excessive loss of road material if the need for such action has been identified. Road surface treatments may include: water, dust, oiling, penetration oiling, sealing aggregate surfacing, chip-sealing, or paving.

**IMPLEMENTATION:** Project location and detailed mitigative measures are developed by an interdisciplinary approach to meet environmental analysis criteria. Forest Service supervisors are responsible for insuring that In-Service projects meet design standards and management requirements. On contracted projects, compliance with contract specifications, and operating plans is assured by the Contracting Officer or Engineering Representative.

**REFERENCES:** Timber Sale Contract; FSH 2409.15, Timber Sale Administration Handbook.

**PRACTICE:** 15.23 - Traffic Control During Wet Periods

**OBJECTIVES:** To reduce the potential for road surface disturbance during wet weather and to reduce sedimentation probability.

**EXPLANATION:** The unrestricted use of many National Forest roads during wet weather often results in rutting and churning of the road surfaces. Runoff from such disturbed road surfaces often carries a high sediment load. The damage/maintenance cycle for roads that are frequently used during wet periods can create a disturbed road surface and sediment source.

Roads that must be used during wet periods should have stable surface and sufficient drainage to allow such use with a minimum of resource impact. Rocking, oiling, paving, and armoring are measures that may be necessary to protect the road surface and reduce erosion potential. Roads not constructed for all weather use should be closed during the wet season. Where winter field operations are planned, roads may need to be upgraded and maintenance intensified to handle the traffic without creating excessive erosion and damage to the road surfaces.

**IMPLEMENTATION:** Road closures (SWCP 11.09) and traffic control measures should be implemented on all roads when damage would occur as a result of use during wet weather. Project-associated implementation procedures can be enforced by District personnel. Hauling activity can be controlled by the certified Sale Administrator within active timber sales. The decision for closure is made when the responsible Line Office determines that a particular resource or facility needs protection from use.

Detailed mitigative measures are developed by an interdisciplinary approach as necessary. Forest Service supervisors are responsible for implementing In-Service projects according to design standards. For contracted projects, compliance with plans, specifications, and operating plans is assured by the Contracting Officer or Engineering Representative.

**REFERENCES:** FSM 7731.4, SWCP 11.09, 13.06, and 14.04; Timber Sale Contract provisions B5.12, B5.22, and C5.12; FSH 2409.15, Timber Sale Administration Handbook; see references in "Best Management Practice" Definition (05--2 and 3).

**PRACTICE:** 15.24 - Snow Removal Controls

**OBJECTIVE:** To minimize the impact of snow melt on road surfaces and embankments and to reduce the probability of sediment production resulting from snow removal operations.

**EXPLANATION:** This is a preventive measure used to protect resources and indirectly to protect water quality. Forest roads are sometimes used throughout the winter for a variety of reasons. For such roads, the following measures are employed to meet the objectives of this practice:

- a. The Purchaser is responsible for snow removal in a manner which will protect roads and adjacent resources.
- b. Rocking or other special surfacing and/or drainage measures may be necessary, before the operator is allowed to use the roads.
- c. During snow removal operations, banks shall not be undercut nor shall gravel or other selected surfacing material be bladed off the roadway surface. Ditches and culverts shall be kept functional during and following roadway use. If the road surface is damaged, the purchaser shall replace lost surface material with similar quality material and repair structures damaged in blading operations.

d. Snow berms shall not be left on the road surface or shall be placed to avoid channelization or concentration of melt water on the road or erosive slopes. Berms left on the shoulder of the road shall be removed and/or drainage holes opened at the end of winter operations and before the spring breakup. Drainage holes shall be spaced as required to obtain satisfactory surface drainage without discharge on erodable fills. On insloped roads, drainage holes shall also be provided on the ditch side, but care taken to insure that culverts and culvert inlets are not damaged.

IMPLEMENTATION: Project location and detailed mitigative measures are developed by the interdisciplinary team during the NEPA process. Contracted projects are implemented by the Purchaser. Compliance with criteria in the contract specifications and operating plan is assured by the contracting Officer or Engineering Representative.

REFERENCES: Timber Sale Contract provisions C5.46; Standard Specification 203.09; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 15.25 - Obliteration of Temporary Roads

OBJECTIVE: To reduce sediment generated from temporary roads by obliterating them at the completion of their intended use.

EXPLANATION: Temporary roads are constructed for a specific short-term purpose, such as, ski area development roads, logging spurs on a timber sale, and so forth. In order to prevent continued low level casual use, such roads are obliterated at the completion of their intended use. Due to short-term nature of temporary roads, continued maintenance funds can not be used for work on temporary roads. Temporary roads that are allowed to remain in use beyond their prescribed time are subject to continued, uncorrected damage, and they can become chronic sediment sources.

Effective obliteration is generally achieved through a combination of the following measures:

- a. Road effectively drained and blocked.
- b. Temporary culverts and bridges removed and natural drainage configuration re-established.
- c. Road returned to resource production through revegetation (grass, browse, or trees).
- d. Sideslopes reshaped and stabilized.

IMPLEMENTATION: For timber sales, temporary road closure, stabilization and removal of temporary structures are accomplished by the Timber Purchaser. Compliance with plans and the Timber Sale Contract is assured by the certified Sale Administrator. Forest Service supervisors are responsible for insuring that other temporary roads developed by the Forest Service met design standards and management requirements. Temporary road development on Forest Service lands that are allowed through special use permits and/or easements are subject to the same obliteration requirements as temporary roads on timber sales. District Rangers or their representatives are responsible for assuring the obliteration of such roads is accomplished.



REFERENCES: Timber Sale Contract provisions B6.62, B6.5, C6.6, and C6.601; FSM 2522; SWCP 11.03, 11.08, 11.09, 13.04, 14.12 - 14, 14.19, and 15.03; NFMA; FSH 2409.15, Timber Sale Administration Handbook; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 15.26 - Surface Erosion Control at Facility Sites

OBJECTIVE: To minimize the amount of erosion and sedimentation at developed sites.

EXPLANATION: On lands developed for administrative sites, ski areas, campgrounds, parking areas, or waste disposal sites much ground is cleared of vegetation. Erosion control methods need to be implemented to stabilize the soil and to reduce the amount of stream sedimentation. Some examples of erosion control methods that could be applied: grass seed, jute mesh, tackifiers, hydromulch, paving or rocking of roads, water bars, cross drains, or retaining walls.

To control erosion and sedimentation, the natural drainage pattern of the area should not be changed. Sediment basins and sediment filters should be established to filter surface runoff. Diversion ditches and berms should be built to divert surface runoff around bare areas. Construction activities should be scheduled to avoid periods of heavy precipitation or runoff.

IMPLEMENTATION: Mitigative measures are developed by the interdisciplinary team during the NEPA process and incorporated in the project by the design engineer. Forest Service supervisors are responsible for implementing In-Service projects to design standards and management requirements. For contracted projects, compliance with plans, specifications, and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: SWCP 11.08, and 11.12; FSM 2522; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 15.27 - Trail Maintenance and Rehabilitation

OBJECTIVE: to minimize soil erosion and water quality problems resulting from trail erosion.

EXPLANATION: Trails often have erosion problems due to poor location, improper maintenance, and the amount or type of use. This deterioration can often be minimized by proper maintenance, restriction of certain types of use, and/or relocation.

Mainline and heavy use trails should have a functional drainage systems (waterbars, culverts at small stream crossings, corduroy, puncheon or boardwalks in boggy areas). Additional measures (lateral ditching, trail relocation, reconstruction, and so forth) may be required in heavy use or problem areas.

IMPLEMENTATION: Each District will develop a trail maintenance plan which determines level, timing and frequency of maintenance. The need for closures will be identified through Forest Transportation Planning. Closure is done by authority of the Forest Supervisor (SWCP 11.09).

REFERENCES: SWCP 11.03, 11.09, 15.01, 15.02, and 15.03; FSH 7709.56b, Drainage Structures Handbook; see references in "Best Management Practice" Definition (05--2 and 3).

16 - MINERALS. Minerals (including oil, gas and geothermal resources) exploration and development activities on National Forest System lands fall into generally one of the following categories:

A. Locatable. The General Mining Law of 1872, as amended, governs the prospecting for and the appropriation of metallic and most non-metallic minerals with a distinct and special value on National Forest System lands that were reserved from the public domain. This applies to most hard rock and placer mineral deposits.

B. Leasable. The Mineral Leasing Act of February 25, 1920, as amended and supplemented, subject certain mineral and energy resources to disposal through leasing actions. These energy and mineral resources include, but are not limited to, coal, oil, gas, geothermal, oil shale, potassium, sodium, and phosphate. The Mineral Leasing Act for Acquired Lands of August 7, 1947, makes all minerals on acquired (purchased) National Forest System lands, unless otherwise reserved or held as outstanding rights, subject to the provisions of the 1920 Minerals Leasing Act.

C. Common Variety Minerals. The Materials Act of July 31, 1947, provides for the disposal and use of common variety mineral materials such as sand, stone, gravel, pumice, cinders and clay located on National Forest System lands. Disposal can be by sale or free use permit to private entities or Federal, State, and local units of government, when consistent with good public land management and in the public interest.

PRACTICE: 16.01 - Administration of the General Mining Law (Act of May 10, 1872) for Mineral Exploration and Extraction on National Forest System Lands

**OBJECTIVE:** To protect water quality from degradation by physical and chemical constituents which may result from mining and associated activities.

**EXPLANATION:** Six instruments are involved in analyzing and approving locatable mining activities which could affect water quality on National Forest System lands. Instruments d., e., and f. may not be necessary in every case. The instruments are listed in sequential order if all are needed:

- a. Notice of Intent to Operate.
- b. Plan of Operations.
- c. Environmental Analysis.
- d. Special Use Permit(s).
- e. Road Use Permits.
- f. State and/or other Federal Agency permit(s)/Certification.

The Notice of Intent to Operate is required from those who propose to conduct mining related activities which might cause disturbance of surface resources on National Forest System lands. The notice is submitted to the appropriate responsible official, normally the District Ranger. The proposed operations described in the notice must be evaluated by the District Ranger. The proposed operations described in the notice must be evaluated by the District Ranger, who will inform the operator within 15 days after the notice is received that either his operation is exempt

from the requirement for an operating plan or one is required. If the District Ranger determines that significant disturbance of surface resources will likely result from the proposed operations, the District Ranger will inform the operator to prepare a Plan of Operations.

A written Plan of Operations is required from all operators who will likely cause a significant disturbance of surface resources. Prior to approval of the Plan of Operations, the operator may be required to furnish a guarantee in the form of an approved surety bond or other security to perform reclamation work. If hazardous material are to be use or generated, documentation that compliance with applicable State or other Federal agency permits/certification have been met is required. The operating plan shall be submitted to the District Ranger who will review the plan and prepare an environmental analysis within 30 days after the receipt of the plan. The environmental analysis either results in the plan of operations not being required, being approved, needing changes or additions, needing more review time (Environmental Assessment) but not exceeding an additional 60 days, or being deferred until an Environmental Impact Statement (EIS) has been prepared and filed by the Forest Service.

Plans of Operation and/or Special Use Permits may be required and issued for construction or reconstruction of roads for access to mining claims or across National Forest system lands on which the operator has no mining claim. However, when an operating plan is required, and does not include access, the plan must be approved prior to issuance of a special use permit regulating access. Special use permits may also be required and issued for water diversions, water transmission facilities, and electric transmission lines needed for mining activities.

Road Use Permits may be required and issued for commercial use of National Forest System roads.

State and/or other Federal Agency Permits/Certification may be required and issued for air quality, water quality, reclamation, disposal and treatment of solid wastes, and so forth. When required, the Forest Service will advise the operator to obtain the appropriate permits or certification. If the proposed operation will involve the use or generation of hazardous substances, the operator will be required to incorporate the permitting requirements of the appropriate regulatory agencies before approval of the Plan of Operations.

**IMPLEMENTATION:** A Notice of Intent or Plan of Operation is required to be submitted by the operator prior to operations. Preventive measures should be set forth within the notice or plan which will control sediment from land disturbing activities, control chemical seepages from mines and tailings, and prevent and correct hazardous substance spills. Locations for spoil and tailing disposal are also specified. The plan is reviewed by an interdisciplinary team. Any need changes are conveyed to the operator and negotiated prior to final plan approval.

Through the use of the Notice of Intent, Plan of Operations, and provisions in any Special Use Permit issued, the responsible Forest Officer, usually the District Ranger, checks for compliance with prescribed measures. Legal remedies are available if mutual cooperation fails. A court may grant injunctive or mandatory relief, and award damages to the extent of property damaged. There may be other remedies for violation of Federal, State and local standards for air and water quality and for the disposal of solid wastes.

**REFERENCES:** 36 CFR 228, 36 CFR 251, and 30 USC 612; NEPA; FSM 1950, 2725, 2726, 2730.3, 2734.3, 7720, 2810, 2817, and 2850; FSH 2809.11, Land Managers Handbook on Minerals Management; FSH 2809.12, Minerals Planning Handbook; SWCP 11.01, 11.02, 11.04, 11.05, 11.06, 11.07, 11.08, 11.11, 11.13, 12.06, 12.07, 12.08, 13.04, 15.01, 15.02, and 15.03.

PRACTICE: 16.02 - Administration of Bureau of Land Management Issued permits, Licenses, or Leases for Mineral Exploration and Extraction on National Forest System Lands

**OBJECTIVE:** To protect soil and water resource values during mineral exploration, extraction, processing and reclamation activities that are conducted on National Forest System lands under the terms of Bureau of Land Management prospecting permits, coal exploration licenses, and mineral leases.

**EXPLANATION:** Through the NEPA process, the Forest Service (FS) and Bureau of Land Management (BLM) make a determination as to whether or not a permit, license, or lease should be issued by the Bureau of Land Management. The Forest Service and Bureau of Land Management develop the permit, license, or lease stipulations needed to protect water quality and other resource values.

**IMPLEMENTATION:** Detailed mitigative measures are developed by an interdisciplinary team during the environmental analysis and are written into the special stipulations section of the permit, license, or lease. Conditions of approval are also developed by the interdisciplinary team to be included in the operating plan.

By interdepartmental agreement, all applications to lease lands under Forest Service jurisdiction are referred to the Forest Service for review, recommendations, and development of special stipulations to protect the surface resources. Technical administration of Bureau of Land Management permits, licenses, and leases is the responsibility of the Bureau of Land Management. Therefore, compliance inspections are the responsibility of the Bureau of Land Management unless the Forest Service is authorized to conduct compliance inspections through an interagency agreement or MOU. The Forest Service may inspect and refer situations of non-compliance with operating plans to the Bureau of Land Management for action.

**REFERENCES:** FSH 2809.11, Land Managers Handbook on Minerals Management; FSH 2809.12, Minerals Planning Handbook; FSM 2725, 2726, 2734, and 2820; Mineral Leasing Act (41 Stat. 437, as amended; 30 USC 181); Federal Coal Leasing Amendments Act (90 Stat. 1083; 30 USC 201 (b) and 207; 16 USC 1276); Act of March 4, 1917 (30 Stat. 1150, as supplemented; 16 USC 520); Section 402 of Reorganization Plan No. 3, of July 16, 1946 (60 Stat. 1097, 1099; 5 USC Appendix); Act of August 7, 1947 (61 Stat. 913; 30 USC 351, 352, 354, 359) as amended by PL 167 and the Geothermal Steam Act (PL 91-581); SWCP 11.01, 11.02, 11.04, 11.05, 11.06, 11.07, 11.08, 11.11, 11.13, 12.06, 12.07, 12.08, 13.04, 15.01, 15.02, and 15.03.

PRACTICE: 16.03 - Administration of Common Variety Mineral Operations

**OBJECTIVE:** To assure protection of water quality and other resource values when common variety mineral materials are used for both In-Service and Out-Service.

**EXPLANATION:** Common variety mineral materials such as sand, stone, gravel, pumice, cinders and clay may be disposed of and developed when their use is consistent with good public land management and in the public interest. Use authorizations will require reasonable erosion control, and rehabilitation and revegetation of the surface. Removal may be approved if adequate measures can be accomplished to prevent erosion or stream pollution and satisfactory arrangements can be made for rehabilitation and restoration as outlined here and in SWCP 15.13, 15.1, and 15.17.

**IMPLEMENTATION:** A project plan or Mineral Material permit identifies the location and conditions of mineral material removal and disposal. Both will be preceded by an environmental analysis. Project location, the scope of the proposal, and detailed mitigative measures are developed using an interdisciplinary approach. The project or permit is approved by the District Ranger or Forest Supervisor. Compliance with the project design standards, the terms and conditions of the permit, and applicable Federal and State regulations is assured by the District Ranger or Forest Service representative.

**REFERENCES:** 36 CFR 228, Subpart C; FSM 2725, 2726, 2734, 2814, 2817, and 2850; FSH 2809.13, Minerals Program Handbook; FSH 7709.11, Transportation Engineering Handbook; Act of July 31, 1947 (61 Stat. 681), as amended by the Act of August 31, 1950 (64 Stat. 571), and the Act of July 23, 1955 (60 Stat. 367; 30 USC 601-603), and pursuant to the Act of June 11, 1960 (74 Stat. 205), and the Act of September 25, 1962 (76 Stat. 587); SWCP 11.04, 11.05, 11.07, 11.08, 15.01, 15.02, 15.03, 15.13, 15.14, and 15.17.

**PRACTICE:** 16.04 - Permits and Administration of Geophysical Operations

**OBJECTIVE:** To protect the quality of surface and ground water from degradation resulting from geophysical activities on National Forest System lands.

**EXPLANATION:** Geophysical activities will be managed in a manner that is both timely and offers protection to other multiple use values and management objectives. Many activities have no effects. However, if effects are identified, standard seismic hole plugging procedures will be followed to prevent contamination of ground water resources, and shot hole placement will be examined for potential impacts to other resource values (SWCP 11.10). New road construction, if allowed, will be located, constructed, and maintained to protect the soil and water resources (SWCP 15.01, 15.02, and 15.03).

**IMPLEMENTATION:** During the environmental analysis, an interdisciplinary team will be assembled to prepare the appropriate NEPA document that evaluates potential impacts, including cumulative, and any needed mitigation measures for the geophysical prospecting permit. The use of water resources for the prospecting activities may require non-Forest Service authorizations or permits.

**REFERENCES:** Organic Act of 1897 (30 Stat. 34, as amended, 16 USC 472, 475-478, 480-482, 551); Multiple Use-Sustained-Yield Act of 1960 (74 Stat. 215, 16 USC 528-531); RPA, as amended (88 Stat. 476; 16 USC 1600-16140; FSM 2860; FSH 2809.13, Minerals program Handbook; In R-1: A Procedural Guide for Oil and Gas Administration, USDA-Forest Service, R-1, Custer NF; SWCP 11.01, 11.07, 11.08, 11.10, 13.04, 15.01, 15.02, and 15.03.

**PRACTICE:** 16.05 - Mineral Activity Coordination Analysis

**OBJECTIVE:** To protect the soil and water resource from degradation during development of minerals resources.

**EXPLANATION:** One essential function of a minerals management program is to forecast what, where, and when mineral activity will occur. While the Forest Service has limited ability to control the pace and location of mineral development, the Forest Service has the authority to influence the process considerably. The Activity Coordination Analysis approach for mineral exploration, development and production is a prudent approach that assists in minimizing adverse impacts to the soil, water, and other resources.

**IMPLEMENTATION:** The specific land area requiring an Activity Coordination Analysis will be identified. This will necessitate the delineation of the study area based on typical oil and gas spacing intervals, pipeline, primary and alternative recovery installation locations, directional drilling opportunities, sensitive areas for water and other resources, and other environmental concerns. An interdisciplinary team will collect and analyze data, prepare an environmental analysis, and develop a management design that will best mitigate impacts to soil and water resources as well as other resource values. Technical staffs familiar with the components of construction, development, and production of an oil and gas field will be utilized.

**REFERENCES:** In R-1: A Procedural Guide for Oil and Gas Administration, USDA-Forest Service, R-1, Custer NF; FSH 2809.13, Minerals Program Handbook: NEPA; SWCP 11.01, 11.02, 11.04, 11.05, 11.07, 11.10, 11.11, 13.04, 15.01, 15.02, and 15.03.

**PRACTICE:** 16.06 - Reclamation of Oil and Gas Well Sites

**OBJECTIVE:** To protect soil and water resources through the development of reclamation plans prior to the approval of an Application for Permit to Drill.

**EXPLANATION:** Reclamation of oil and gas well sites is necessary to protect the soil and water resources, both on- and off-site. Revegetation with plants or grasses, forbs, shrubs and trees that provide the best protective ground cover should be utilized to prevent erosion and stream sedimentation. Revegetation species should, however, be selected that provide for an immediate ground cover and allow for the reestablishment of the desirable species over the long-term. For both producing and non-producing well sites, reclamation will normally commence within the first growing season following completion of the drilling activities. In the case of a producing well site, only those portions of the site not required for production need be reclaimed. Any necessary drainage or erosion control structures to prevent erosion and degradation of water quality should be installed during rehabilitation of the site. Temporary roads used to access oil and gas well sites are also reclaimed and obliterated upon completion of their intended use.

**IMPLEMENTATION:** Detailed erosion control and mitigative measures are developed by an interdisciplinary team during the environmental analysis and are incorporated into the Plan of Operations. Compliance with permits and the operating plan is assured by the District Ranger or Forest Service representative. Non-compliance with approved operating plans are referred to the Bureau of Land Management for action.

**REFERENCES:** 43 CFR 3164; FSM 2840; In R-1: A Procedural Guide for Oil and Gas Administration, USDA Forest Service, R-1, Custer NF; SWCP 13.01, 13.04, 15.05, 15.06, and 15.25; Surface Operating Standards for Oil and Gas Exploration and Development, 1978, Bureau of Land Management, U.S. Geologic Survey, and USDA, Forest Service; Surface Environment and Mining (SEAM) REclamation User Guides.

**PRACTICRE:** 16.07 - Reserve Pit Location, Design, Operation, and Reclamation

**OBJECTIVE:** To protect the quality of surface and ground water from degradation by physical and chemical contaminants originating from the construction and operation of reserve pits at drilling sites.

**EXPLANATION:** Under current technology, a reserve pit is normally utilized to collect, store, and recycle drilling fluids in oil and gas well drilling operations. Reserve pits must be located,

operated, and reclaimed so as to prevent adverse effects on the surface and ground water resources. Reserve pits should be designed and constructed utilizing the following standards:

- a. Reserve pits should be located in the cut portion of the drill pad and not at the edge of steep slopes.
- b. Special measures may be required to insure the containment of drilling fluids where the reserve pit must be placed in a sensitive location or in porous material. These measures may consist of lining the reserve pit with an impermeable material substance such as plastic or bentonite or the use of a closed mud system.
- c. The pit should be constructed so as to prevent sloughing and to maintain the integrity of the liner. Fill material may be used and laid down to provide better consolidation than from natural, in-place materials.
- d. The use of non-toxic drilling fluids should be encouraged whenever possible.
- e. Dumping trash in the reserve pit will be prohibited.
- f. Reserve pit reclamation methods will be utilized that provide positive protection to both ground and surface water.

**IMPLEMENTATION:** An interdisciplinary approach during the NEPA process will develop and specify the project location, design features, operating requirements, mitigative measures, and reclamation needed. Compliance with permits and the operating plan is assured by the District Ranger or Forest Service representative.

**REFERENCES:** In R-1: A Procedural Guide for Oil and Gas Administration, USDA-Forest Service, R-1, Custer NF; Surface Operating Standards for Oil and Gas Exploration and Development, 1978, Bureau of Land Management, U.S. Geologic Survey, and USDA-Forest Service.

**PRACTICE:** 16.08 - Oil and Gas Well Blowout Contingency Plan

**OBJECTIVE:** To protect the soil, water and other resources from oil and gas well blowout impacts.

**EXPLANATION:** Although infrequent, uncontrolled emissions from oil and gas wells can occur. Fluids emitted can be oil, fresh water, salt water, or a combination thereof. A Well Blowout Contingency Plan is necessary in order to minimize impacts to soil and water resources.

**IMPLEMENTATION:** Individual operators are required to provide Blowout Contingency Plans for emergency situations. The plans must meet the following items:

- a. List of agencies, institutions and persons to notify (SWCP 11.07).
- b. A "plan of attack" to handle the various levels of emergencies.
- c. Soil and water protection measures to be instituted while the blowout is occurring and immediately following the control of the well blowout.
- d. Established blowout or toxic spill damage assessment time gates and goals (SWCP 11.07).

- e. The frame work necessary to establish an interdisciplinary team to develop and implement a reclamation plan.

REFERENCES: 43 CFR 3160; In R-1: A Procedural Guide for Oil and Gas Administration, USDA-Forest Service, R-1, Custer NF; FSM 7442 and 7443; 40 CFR 112; Oil and Hazardous Substances Pollution Contingency Plan for EPA Regions 8 and 10, 7/26/85; SWCP 11.07 and 11.11; Surface Environment and Mining (SEAM) Reclamation User Guides.

PRACTICE: 16.09 - Abandoned Mine Land Reclamation

OBJECTIVE: To reduce erosion and water quality degradation by sediment and toxic substances from abandoned mined lands through reclamation of these lands.

EXPLANATION: Abandoned mined lands are frequently erosive, bare of vegetation, or are exuding toxic substances and/or sediment into nearby streams. Some sites may pose a threat to public health or safety. Reclamation plans for reducing impacts to soil and water resources are needed for each abandoned mine. Specific practices may vary from site to site, ranging from simple revegetation or reshaping with earth-moving equipment, to restoration to pre-disturbance conditions. All ground-disturbing activities should comply with SWCP 11.03, 13.01, 13.04, 15.05, and 15.06.

It is important that the site be revegetated with plant species that accomplish the purposes of reclamation. Species may be native or introduced and may be both live plants or seed. Fertility of soil/spoil materials and climate will affect species selection and survival, and soil amendment recommendations.

IMPLEMENTATION: This practice is typically implemented through the development of an inventory of all abandoned mined lands, and for inclusion of those lands needing reclamation within SWCP 11.03. If a soil and water resource problem area is observed and documented, an interdisciplinary team will assess that abandoned mine site, develop the necessary actions to correct the problem, and integrate them into the Forest Planning process for funding and execution. The NEPA process will be followed in the planning and implementation of reclamation measures. The Forest Service should work toward inclusion of the more important abandoned mined lands in State inventories and reclamation plans, since both the State and the Office of Surface Mining (OSM) can provide funding for State projects.

REFERENCES: FSM 2522, 6740, 7442, 7443, and 7460; FSH 2509.15, Watershed Improvement Handbook; NFMA; SWCP 11.03, 13.01, 13.04, 15.05, and 15.06; Abandoned Mine Lands Reclamation Control Handbook, Office of Surface Mining; Surface Environment and Mining (SEAM) Reclamation User Guides.

17 - RANGE. Range management involves range and resource analysis, allotment management planning, and a grazing permit system. It includes controlling overall livestock numbers and season of use, improvements, providing for wildlife needs, and restoration of deteriorated range lands.

The historical use of national Forest System lands in the Northern and Intermountain Regions for grazing generally predates the actual establishment of individual Forests. During this early period, grazing use was typically uncontrolled with generally an excessive number of animals using these lands and producing numerous soil and water resource problems. The current situation is much improved over that which existed historically. Most allotments maintain the



productive status of the land and protect underlying soils. There are, however, some allotments where the range remains in a deteriorated condition. These SWCP's are designed to restore deteriorated range and maintain all range in a productive state.

**PRACTICE: 17.01 - Range Analysis, Allotment Management Plan, Grazing Permit System and Permittee Operating Plan**

**OBJECTIVE:** To maintain and protect soil and water resources through sustained forage production and managed multiple use of range forage.

**EXPLANATION:** An analysis of potential and/or existing range is conducted by an interdisciplinary team to evaluate productive capabilities, inherent hazards, resource values, and uses. Based on this analysis, the Forest Service, in cooperation with the permittee and other users, prepares a written allotment management plan and issues a permit to authorize livestock grazing as per stipulations in the plan. These documents include measures to protect other resource values, such as water quality and riparian areas, and to coordinate livestock grazing with other resource uses. Specific methods for controlling when, where, amount of utilization, and numbers of livestock to be grazed are covered in the plan. Rangeland improvements and an implementation schedule are also included. Permittees are required to contribute a portion of the cost of new improvements and to maintain the existing improvements on an allotment.

A permittee operating plan is prepared, reviewed and revised annually to reflect direction in the allotment management plan, to account for current allotment conditions and trends, and to adjust for unexpected resource problems (such as drought). The amount of livestock use is determined primarily through measurement of vegetative utilization. Allowable use is determined by research, vegetative trends, and experience.

**IMPLEMENTATION:** The District Ranger is responsible for analysis of range allotments, completion of the environmental analysis, preparation of allotment management plans, and processing grazing applications. The Forest Supervisor approves allotment management plans and issues grazing permits with required stipulations and conditions. Most permits are issued for ten-year terms. Allotment management plans are revised as needed. Permittee operating plans are prepared or revised annually, to adjust for current allotment conditions and trends, and to incorporate seasonal instructions. The permittee carries out the plans under the direction and supervision of the District Ranger or Forest Service representative. Corrective action is taken if a permittee does not comply with grazing permit conditions designed to protect the soil and water resources.

**REFERENCES:** FSM 2203, 2204, and 2323.2 - 24; FSH 2209.12, Range Management Information System Handbook, FSH 2209.13, Grazing Permit Administration Handbook, and FSH 2209.14, Service-wide Range Analysis and Management Handbook; NEPA; SWCP 11.01, 11.02, 11.03, and 11.05.

**PRACTICE: 17.02 - Controlling Livestock Numbers and Season of Use**

**OBJECTIVE:** To maintain and protect soil and water resources through management of livestock numbers and season of use.

**EXPLANATION:** In addition to the proper stocking rate and season of use specified in the grazing permit, annual field checks are made to identify needed adjustments in distribution, season of use, and livestock numbers. Analysis includes:

- a. Range readiness evaluations to assure that the soil is not too wet and that sufficient forage growth has occurred.
- b. Livestock counts to assure that only the permitted livestock enter the allotment.
- c. Forage and browse utilization measurements to provide data for improved livestock distribution and stocking.
- d. Periodic assessment of rangelands to verify soil and vegetative condition and trend.

Standard measurement techniques for allowable utilization have been established for key vegetative types. Specific standards and guidelines have been established prescribing proper utilization levels by vegetative type. Livestock numbers and season of use are adjusted to reflect the results of these field checks.

IMPLEMENTATION: Allotments are administered by the District ranger or Forest Service representative. Permit provisions are carried out by the grazing permittee, as directed in the permit and annual operating plan. Appeals are made to the Forest Supervisor. Field checks and measurements are made periodically by the Forest Service. Numbers, seasons, and use patterns may be changed annually to reflect current allotment conditions and trends and, if necessary, the permit may be modified, cancelled, or suspended in whole or in part.

REFERENCES: FSM 2210, 2230, 2240, 2250, and 2323.25; FSH 2209.14, Service-wide Range Analysis and Management Handbook; FSH 2209.21, Range Analysis and Management Handbook; SWCP 11.02.

PRACTICES: 17.03 - Controlling Livestock Distribution

OBJECTIVE: To maintain and protect soil and water resources including riparian areas through controlling livestock distribution.

EXPLANATION: Livestock use within allotments is typically not uniform due to variations in topography, water availability, vegetation type, and forage condition. Several techniques are used to achieve proper livestock distribution and reduce the impact on areas which are sensitive or naturally overused. These techniques include:

- a. Construction of fences and implementation of seasonal or pasture systems of management.
- b. Placing of water developments in areas that receive little use and closure of water developments when proper use has been achieved.
- c. Riding and herding to shift livestock locations.
- d. Placing salt or supplements away from water in forage areas with light grazing use to attract livestock.
- e. Installation of range improvements such as construction of shade structures, fertilization, prescribed burning, or seeding.
- f. Moving livestock when prescribed utilization levels are reached.

Open herding, limiting trailing, and use of new bed grounds nightly are additional techniques used for goats and sheep. Developing sufficient watering places is one way to limit the amount of trailing. Livestock distribution needs are determined through evaluations of range conditions and trends, including utilization studies.

**IMPLEMENTATION:** Livestock distribution practices are carried out by the permittee under supervisor of the District Ranger or Forest Service representative. Direction is incorporated into the allotment management plan and the annual operating plan. The annual operating plan becomes an integral part of the grazing permit and provides current Forest Service instructions. These instructions reflect current allotment conditions and vegetative trends.

**REFERNECES:** FSM 2210, 2230, 2240, 2250, and 2323.25; FSH 2209.14, FSH Service-wide Range Analysis Handbook; and FSH 2209.21, Range Analysis and Management Handbook; SWCP 11.02.

**PRACTICE:** 17.04 - Rangeland Improvements

**OBJECTIVE:** To maintain and protect soil and water resources through the use of rangeland improvements.

**EXPLANATION:** Rangeland improvements are used to improve management and restore or improve forage quality, quantity, or availability. These may consist of providing rangeland rest and/or deferment through rotation grazing, fencing, or lighter grazing use by changing the grazing season, kind, class, or permitted number of livestock. Other measures may include stream channel stabilization efforts such as riprapping, gully plugging, planting, or mechanical treatments such as pitting, chiseling, or furrowing. Reseeding and/or fertilization may be done individually or in conjunction with any of these measures. Water developments are often included in rangeland improvement projects. Improvement efforts are directed at increasing the ability of the range to produce forage and protect and provide for other resources at a specified ecological serial stage. Practices used for improvement of watershed conditions, which may include the exclusion of livestock, are described in SWCP's 11.03 (Watershed Improvement Planning and Implementation) and 11.09 (Management by Closure to Use). All range water improvements constructed should protect the water quality of both surface and ground water sources.

**IMPLEMENTATION:** The permittee is a cooperator in rangeland improvements and may complete the work under Forest Service direction. Implementation may also be done by Forest crews. Range improvement needs are recognized in the Range Allotment Planning Process and are scheduled for implementation in the allotment management plan. An interdisciplinary team provides consultation and help in the development of improvement programs.

**REFERENCES:** FSM 2210, 2240, 2250, and 2323.26; FSH 2209.22, Structural Range Improvement Handbook; FSH 2209.23, Nonstructural Range Improvement Handbook; SWCP 11.02, 11.03, and 11.09.

**18 - FIRE SUPPRESSION AND FUELS MANAGEMENT.** Emergency fire suppression activities on National Forest System lands are conducted to reduce erosion and the loss of soil productivity, degradation of water quality, and threats to life and property both on-site and off-site. Suppression activities include fireline and access road construction, firing operations, and fire retardant drops. Water quality and soil erosion and productivity objectives are weighed with the need for rapid suppression during the development of suppression strategies. Since some

watershed damage will likely result from suppression activities, an objective of the fire suppression program is to rehabilitate suppression-related damage.

Fuels management activities are intended to reduce the size, cost, and damage of wildfire. Fuels management is a form of Vegetation Manipulation (ch. 13). Vegetation is manipulated by changing fuel type, creating fuel breaks, or by reducing or altering fuels over extensive areas. Fuels management is also concerned with the manipulation of dead fuels such as cull logs and stash. These materials may be utilized, removed, or burned to reduce fuel loading.

**PRACTICE: 18.01 - Fire and Fuel Management Activities**

**OBJECTIVE:** These administrative, corrective and preventive measures include: (1) fuelbreak construction; (2) type conversions; (3) greenbelt establishment to separate urban areas from wildlands; (4) fuel reduction blocks; (5) access roads for rapid ingress and egress; (6) fire suppression activities; (7) fuel utilization and modification programs; and (8) public information and education programs.

**IMPLEMENTATION:** Fuel management is implemented through normal program planning and budgeting, Forest Planning, and NEPA processes. Other resource areas such as Timber, Range, and Wildlife may initiate projects that also benefit Fire Management through fuel modification. Fuel management projects are evaluated by an interdisciplinary team. The management objectives and requirements, and multiple resource protection prescriptions are documented through the NEPA process. Application of controls and prescriptions are the responsibility of the project officer. Suppression activities are conducted in response to fires as they occur.

**REFERENCES:** FSM 1950, 5102, 5103, 5121, 5150.2, 5150.3, and 5151; NEPA; NFMA; SWCP 11.02 and 11.06.

**PRACTICE: 18.02 - Formulation of Fire Prescriptions**

**OBJECTIVE:** to provide for soil and water resource protection while achieving the management objective through the use of prescribed fire.

**EXPLANATION:** prescription elements will include such factors as fire weather, slope, aspect, soil moisture, and fuel moisture which influence the fire intensity. These elements have a direct effect on whether or not a litter layer remains after burning and whether or not a water repellent layer is formed. The amount of remaining litter and induced water repellency can significantly affect erosion rates, water quality, and runoff volumes.

**IMPLEMENTATION:** The prescription elements are defined by the interdisciplinary team during the environmental analysis. Field investigations are conducted to identify site specific conditions which may affect the prescription. Both the optimum and tolerable limits for soil and water resource needs should be established.

**REFERENCES:** FSM 5140, 5150.3, 5151, AND 5153.

**PRACTICE: 18.03 - Protection of Soil and Water from Prescribed Burning Effects**

**OBJECTIVES:** To maintain soil productivity, minimize erosion, and prevent ash, sediments, nutrients, and debris from entering surface water.

EXPLANATION: Some of the techniques used to prevent soil erosion and water quality degradation are: (1) construct water bars in fire lines; (2) reduce fuel loadings in drainage channels; (3) maintain the integrity of the Riparian Area; (4) avoid intense fires, which may promote water repellency, nutrient leaching, and erosion; (5) retain or plan for sufficient ground cover to prevent erosion of the burned sites; and (6) removal of all debris added to stream channels as a result of prescribed burning, unless debris is prescribed to improve fisheries habitat.

IMPLEMENTATION: Forest Service and/or other crews are used to prepare the units for burning. This includes water barring firelines and reducing fuel concentrations. The interdisciplinary team identifies Riparian Areas and soils with water repellent tendencies as part of the environmental analysis.

REFERENCES: FSM 5140, 5142, 5150.3, 5151, and 5153; SWCP 11.02, 11.05, 11.06, and 13.04.

PRACTICE: 18.04 - Minimizing Watershed Impacts from Fire Suppression Efforts

OBJECTIVES: To avoid watershed impacts in excess of that which would be caused by the fire itself.

EXPLANATION: Heavy equipment operation on fragile soils, sensitive areas, and steep slopes should be avoided when possible. Major project fires utilize a Resource Advisor to advise the Incident Commander on resource values during the suppression effort. National fire management policies were changed in 1978, to provide in part that an Escaped Fire Situation Analysis shall be prepared for all fires which escape initial suppression action. The analysis will be prepared by a Line Officer with Incident Management Team input. Watershed considerations must be part of the analysis.

IMPLEMENTATION: A Resource Advisor is assigned by the Forest Supervisor and works for the Incident Management Team. Technical resource staffs are normally available to identify fragile soils, sensitive areas, and unstable areas and would be assigned to the fire as technical experts.

REFERENCES: FSH 5109.19, Fire Management Analysis and Planning Handbook; FSM 5130.3 and 5132; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 18.05 - Stabilization of Fire Suppression Related Watershed Damage

OBJECTIVE: To stabilize all areas that have had their erosion potential significantly increased, or their drainage pattern altered by suppression related activities.

EXPLANATION: Treatments for fire-suppression damages include, but are not limited to: (1) installing water bars and other drainage diversions in fire roads, firelines, and other cleared areas; (2) seeding, planting and fertilizing to provide vegetative cover; (3) spreading slash or mulch to protect bare soil; (4) repairing damaged road drainage facilities; and (5) clearing stream channels of debris that is deposited by suppression activities.

IMPLEMENTATION: This work is done by the fire fighting forces either as a part of the suppression effort or before crews and equipment are taken off the fire lines. The Incident Commander is responsible under the direction of the local Line Officer for repair of suppression related resource damage.

REFERENCES: FSH 209.13, Burned-Area Emergency Rehabilitation Handbook; FSM 2523 and 5130.2; SWCP 11.13, 13.04, 15.03, 15.06, and 15.11; see references in "Best Management Practice" Definition (05--2 and 3).

PRACTICE: 18.06 - Emergency Rehabilitation of Watersheds Following Wildfires

OBJECTIVES: To minimize the loss of soil and on-site productivity, the deterioration of water quality, and threats to life and property, both on-site and off-site.

EXPLANATION: Emergency rehabilitation is a corrective measure that involves a variety of treatments. Treatments may include: (1) seeding grasses or other vegetation to provide a protective cover as soon as possible; (2) fertilizing; (3) fencing to protect new vegetation from livestock; (4) clearing debris from stream channels; and (5) constructing trash racks, channel stabilization structures and debris retention structures. Treatments are selected on the basis of on-site values, downstream values, probability of successful implementation, social and environmental considerations, and cost as compared to benefits.

IMPLEMENTATION: Burned-area surveys shall be performed promptly to determine if watershed emergency rehabilitation treatment is needed. Surveys of all fires that exceed 300 acres shall be conducted by an interdisciplinary team. The responsible official, typically the District Ranger, may request a burned-area survey by an interdisciplinary team for smaller fires if significant resource damage has occurred. Team members normally include a hydrologist, a soil scientist, and other technical resource staffs, as needed. They are typically designated prior to the fire season to become reacquainted with Forest Service policy and direction. The survey and proposed rehabilitation treatment measures will be delivered to the Regional Office and/or the Washington Office for approval within three days of control of the fire. If the rehabilitation project is funded, a project supervisor and restoration team will begin work with the objective of project completion before damaging storms occur. Rehabilitation projects are evaluated following major storms and runoff events and at least annually until the watershed is stabilized. The evaluation determines the effectiveness of the rehabilitation measures and indicates if follow-up actions are needed.

In situations where National Forest System and other intermingled lands are involved in similar emergency rehabilitation efforts from large wildfires, interagency rehabilitating teams, if applicable, may be requested to conduct burned area surveys. Prior coordination and agreements are necessary to insure each land owner's needs and objectives are met.

REFERENCES: FSM 2523 and 2323.43b; FSH 2509.13, Burned-Area Emergency Rehabilitation Handbook; SWCP 11.02, 11.03, and 11.06; In Montana: Interagency Emergency Watershed Rehabilitation Procedures, Draft, July 1987.s